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The Industrial-Arts Magazine

September, 1924

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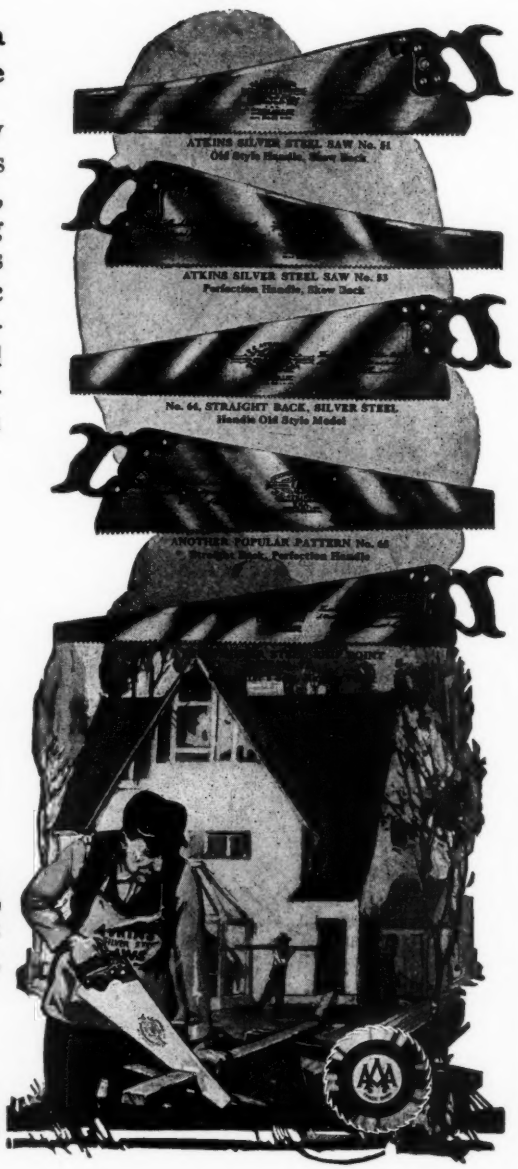
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INDUSTRIAL-ARTS MAGAZINE

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The Pioneer Manual Labor Schools

Charles P. Coates, St. Louis, Mo.

THAT INSTRUCTION in the manual arts is of high antiquity seems not to be generally understood, yet it has perhaps the longest history of all the branches of education. The endeavors to solve the problems of materials, methods, and aims begin with the beginnings of history and have not yet attained to a satisfactory solution. Today, on the other hand, the manual arts curriculum is in a state of ceaseless flux.

Although sweeping statements concerning "first events" and "oldest institutions" are not tolerated in the best research circles, nevertheless I suspect that we may safely look for the protoplasm of the institution of apprenticeship in the baked bricks of Babylon, for the Code of Hammurabi (2100 B. C.) conferred upon an artisan who adopted a son and taught him a trade certain legal immunities. Again, the Egyptians often amused themselves by drawing cartouches and series of caricatures in which the relation of master to apprentice is unmistakably revealed. Plato apparently was content with the system as promulgated in his day and refrained from adverse comment upon it. In Roman times tools were crude, power had not been developed beyond the tread-mill stage, windmills were not introduced until the time of the Crusades, and all work was performed by slaves. Successive wars, the great national industry, provided brawn continuously to perform the more arduous mechanical operations. All in all then, manual education came not unnaturally to be despised. It is significant that upon the subject of apprenticeship the Roman Code is silent.

One of the more speculative of the modern Catholic historians, J. B. O'Connor, believes that it was the followers of Pachomious, who, just before the barbarian invasions had emigrated from Palestine, that gave medieval man the first example of craftsmanship performed by others than the unfree. "These monks," he tells us, "were of the Cenobitical school of monasticism and as such skilled in all the trades." Now it is reasonable to suppose that elemosynary institutions since the beginning of time have required a certain amount of labor from their inmates. It is an interesting thought how the Benedictines, Franciscans, Moravians, Friends, and the vast number of religious denominations that played a part in early handicraft instruction merely put into definite form what must have been practiced long before them.

It hardly needs to be pointed out to students of the history of education that up to the opening years of the fifteenth century wars and pilgrimages were practically the only reasons which led people of one country to another. About this time, however, man discovered himself and the world about him. With increased travel came the improvement of the miserable roads and bridges one finds mentioned in all the early chronicles, the expansion of the market, and the rise of the craft guilds. With the general aspects of restraint of trade, working conditions, etc., which characterized the guild system you are quite familiar. It is well, perhaps, merely to recall that in medieval days apprenticeship was a method of *learning by doing something, something immediately worthwhile.*

There is something deeply impressive in this wider expansion of the market and the introduction of surreptitious workers to replace regulated skilled labor supply. In a way, too, it makes tolerably obvious the vast number of utopian schemes—those of Andrae, of Bacon, and of Gott—all published between 1600 and 1650. It accounts in no uncertain way for the visit to England of Comenius in 1641; for the veritable crop of schemes for manual education that closely followed in point of time the plan which he fruitlessly entertained for the organization of all existing knowledge; and for an increased interest in movements for the amelioration of benignted souls in the New World. A glance at the charters of the early colonists shows this concern, for all of them are shot through with admonitions concerning the Indians. In 1619 the London Company, pursuant to their charter requirements, granted an extensive tract of land for the support of an Indian manual labor school in their domain. Little came of carefully drawn plans, however, for before the buildings had been erected President Copeland's settlers were massacred.

With the early traders sent out by the Spanish Crown came a number of Jesuits and Franciscans. An early source for the work of these pioneers is the *Memorial of Fray Alonzo Benavides,* published in Madrid in 1630. From this document it appears that

in the Tanos Nation "there were schools for all the trades." Yet Father Ephraim Engelhardt, the leading authority on the early missions, tells in an interesting letter that "one must not take Benavides statement in a literal sense." Just what in the way of manual education was carried on by these Fathers we shall never know.

Bent on the Christianization of the world, the Moravian missionaries pressed into the wilderness of North America and founded at Bethlehem and Lititz, Pennsylvania, what now appears to have been manual labor schools. It is the opinion of one long familiar with the diaries of the Moravian Brethren, Archivist Abraham R. Beck, that "in these diaries there is to be found no entry that would justify the use of the term 'manual training' as it is understood today." Diaries in the archieves of the church at Winston-Salem, North Carolina, bear witness to the fact that extensive vocational training was in vogue there as early as 1764. Unique indeed are the accounts of the long wilderness trips made by boys and by girls to reach the place and to enter the schools.

Let us turn now to the *Pioneer Manual Labor School*: With the Peace of Paris began a series of political persecutions which brought about the exodus, secretely and in small numbers, of numerous bands of Huguenots. Being much aware of the quality of these emigrants as settlers the English Government provided transportation to America for a colony which, under the leadership of a popular preacher, had rendezvoused at Plymouth. In April, 1764, the emigrants reached Charleston, South Carolina—the first jurisdiction in the world to abolish imprisonment for debt—and shortly thereafter received from the Provincial Assembly a charter for the settlement of New Bordeau in the then Abbeville District. Later on there drifted to the colony the accomplished and eccentric Jean De La Howe, "the Hippocrates of this new region of the world."

While comparatively little in the way of documentary evidence is extant, yet around the figure of the French doctor gathers a full measure of romance and tradition. Neither his birth-date nor his birth-place were known to the colonists. It is variously stated in the early chronicles of the region that he was born in Hanover, in the north of France, in Holland, or "perhaps in Flanders, where he received a finished education for that day in the medical profession." By these, too, he is represented as "a man of small stature, possessing the tastes and ease of manners of the French gentry." His most intimate friends—those to whom he left mourning rings—were army officers, and the local tradition of his early connection as surgeon to some army corps may be grounded in fact. Not until the past year, when I discovered a press notice, was it known to the descendants of the founders of the colony that, prior to his coming to New Bordeau, he had been married to the widow of Captain Robert Boyd of Charleston.

In a wild spot near some beautiful falls, which soon will furnish power for the De La Howe State School, De La Howe made for himself and for the woman he loved a delightful retreat. "It was ornamented with artificial avenues of trees, flanked by fruit orchards, and farther on, vineyards, trees and shrubs of exotic and native growth—guarded by stone walls." In the only account of his life ever written by one who had gathered material from those who knew the man, it is stated that his fame as a physician spread through the whole region, that his opinions were greatly respected by the colonists, and that he was prominent in the affairs of the county and state. He died at an advanced age, but left no family.

A self revealing document concerning the founder of the Pioneer Manual Labor School is the will by which, in 1796, he provided for the disposition of his fortune. It is singular that although Barnard mentioned this will in one of his early journals, yet no one has heretofore closely examined it. To page through this lengthy holograph is to be much aware of what occupied the thoughtful hours of the testator. While on the whole it is nobly phrased and filled with beneficent utterances, still with almost unparalled conceit he enjoined his executors, the president and members of the Agricultural Society of South Carolina (second of its kind in America) to perpetuate in letters of hammered iron two names and the special deed for which he wished to be remembered:

"In premis it is my will and desire that my remains shall be buried as near as can be to the spot where those of the late Rebecca Woodin are deposited on the hill opposite to the dwelling house wherein we both resided together and I still do reside on my plantation or farm named Lethe, as the last mark and testimony of my friendship and sense which I have retained of her merit: And it is further my will that as soon as it can conveniently be done after my decease a substantial wall shall be built round our sepulchres, not less than ten feet square in the clear, eight feet above ground, and two bricks thick, with a substantial door and lock, and that the whole shall forever be kept up and in good order.....and that the following inscription in large capitals shall forever be kept incased in the door: Rebecca Woodin, Obiit, 4th Oct., 1788: Joes de la Howe fundator hujus Seminarii Agriculturalis, (sic) with the date of my decease."[1]

Quite different in plan, in endowment, and in aim from anything that had gone before was the agricultural seminary contemplated in De La Howe's will. In the *Columbian Magazine*, a Philadelphia periodical of considerable standing, an article appeared in the month of April, 1787, in which an anonymous writer outlined in great detail a manual labor school for "new sections of the country, where the inhabitants are thinly settled, and whose children are to be educated with a special reference to a country life." For almost a decade De La Howe had had this article in mind. In the second clause of his testament he states that the seminary shall be "established, organized, and forever be kept in conformity as near as can be *(mutatis mutandis)* to the Columbian plan." Into the details of this, *the first*

[1]Mr. J. B. Branch, Superintendent of the De La Howe State School—for the school is in operation—has generously assisted me in securing a photograph of the tomb, and I publish it here for the first time.

THE TOMB OF JEAN DE L AHOWE IN 1923.

complete plan for a manual labor school ever published, I cannot now go. A study of the original plan shows that with the exception of the provision for a brewery, its outlines closely parallel those followed in many state industrial schools of today.

FOR THE COLUMBIAN MAGAZINE[1]

Plan for establishing Schools in a new country, where the inhabitants are thinly settled, and whose children are to be educated with a special reference to a country life.

Take any number of settlers, we will suppose sixty families, collected in a village, and they will be able to support a schoolmaster, and easily maintain their children at school: for twenty shillings a year, paid by each family, will make up a competent salary for the master, and the children will be cloathed and fed at home.

But if these sixty families are dispersed over a large tract of country, from twenty to forty miles in extent, how shall their children receive the benefits of education? The master's salary, it is true, can be paid as in the former case; but few parents will be disposed to incur the heavy expence of sending their children from home, and boarding them at a distant school. Hence, in such a scattered settlement, general ignorance will ensue; and the people consequently degenerate into vice, irreligion and barbarism.—To remedy evils of such magnitude will be difficult; perhaps it will be thought impracticable: to attempt it, however, will be laudable; and all those who have the dearest interests of society at heart, will give the measure their support.

If by charitable donations, or by grants of the state, adequate funds could be formed, to defray the expenses of the board and tuition of such children, the evils before mentioned would be remedied: but such funds are not to be hoped for: and if they could be obtained, it might well be doubted whether that would be the best mode of educating children destined for a laborious country life. There the boys are to be the future farmers, and the girls the farmers' wives. If both could, in early life, be well instructed in the various branches of their future employments, they would make better husbands, better wives, and more useful citizens. And if the mode of communicating such instruction could at the same time enable them largely to contribute to their own support, another important advantage would be gained.—These reflections have given rise to the following

Plan of Education for a Country Life.

1. Let three or four hundred acres of land be appropriated for the use of a school: let it consist of meadow, tillage and wood land, in convenient proportions.

2. Let a skilful and industrious manager be provided, who shall himself be a complete farmer, and have two labourers, one acquainted with farming, the other with gardening, to assist him:

3. Let the farm be completely stocked, and all the requisite carriages and husbandry utensils provided: such tools as are designed for boys, to be made of sizes suited to their strength.

4. Let the necessary buildings be erected for a school, a boarding house, a barn and work-shop. These may be very plain and cheap, and at the same time very comfortable. The necessary furniture and tools must also be provided.

5. A schoolmaster and schoolmistress must be chosen with much circumspection. The latter will be the housekeeper.

6. A cook will be necessary; and she should know how to dress the plain, wholesome food of the country, in the best manner.

7. The children's beds and bedding, cloaths and materials for cloathing, must be provided by their parents.

The necessary foundations being thus laid, the school and farm may be conducted agreeably to the following regulations.

1. No boy or girl under eight years of age should be admitted.

2. Both boys and girls should be taught to read, write and cypher. The boys should also be instructed in every useful branch of husbandry and gardening, and the girls in every kind of work necessary for farmers' wives to know and practise.

3. For the purpose of working, let the boys be divided into such a number of classes as shall be judged convenient, distributing equal proportions of the larger and smaller boys to each class. Whenever the nature of the work to be done will admit of it; let equal portions of it be assigned to the several classes, in order to excite their emulation, to excel in industry and skill: and for this reason each portion of land should be cultivated, through a whole season, by the same class to which it was first allotted.—It will be obvious to direct the several boys in the same class, to perform such parts of the general labours required of it, as shall be adapted to their several capacities and strength.

[1]The present is an exact reproduction of the original article except that the old-style letter "ſ" has been replaced.

4. All the boys may be taught the methods of making and rearing nurseries of the most useful kind of fruit trees, shrubs and bushes, and of improving the former by grafting and budding. Each boy should have an equal portion of land allotted to him, on which he should raise a nursery; and when he has finished his course of education, should be allowed to take home with him all the trees, shrubs and bushes he has reared and cultivated; excepting only such a portion as shall be requisite for supplying the school-farm. In like manner he should be allowed to take home with him a collection of useful garden seeds. In this way the most valuable fruits and plants would in a few years be spread and cultivated through the whole settlement.

5. When orchards shall be grown, they may be instructed in the art of making and fermenting cyder, so as to produce a soft and pleasant liquor.

6. A small brewery may be erected on the farm, and all the boys taught to malt barley and oats; and both boys and girls may be taught the art of brewing, so far, at least, as the same might be practised in every farmer's family.—Perhaps by extending the plan of the malthouse and brewery, they might be able to supply that wholesome and nourishing liquor, good beer, to a great part of the settlement; and thus as use of pernicious, distilled liquors be superseded. Malt, at least, might thus be furnished, and yield a small revenue towards supporting the school.

7. The management of cattle will make a necessary branch of their education; and the modern method of managing bees will well deserve their attention.

8. Tending the cattle, and providing fuel and fencing stuff, will be the principal employments of the winter. But the boys may also make the wood-work of all those utensils of husbandry which will be requisite for the ensuing season. The elder boys will be capable of handling axes, and all the other tools used in those employments.

9. The girls will be taught to sew, to knit, to spin, to cook, to make beds, to clean house, to make and mend their own cloaths, to make the boys cloaths when cut out, and to mend them—to milk cows, and to make butter and cheese.

10. That they may learn to cook and perform all other household work, they should be divided into classes, in the same manner in which the boys were classed, and assist the house keeper and cook, a week at a time, in rotation.

11. A collection of children, from eight to fourteen or fifteen years of age, thus regularly employed, on a good farm, would be nearly able to maintain themselves; and if the expences of their schooling can thus be reduced as low, or nearly as low, as when, in ordinary cases, they live at home, the great obstacle to their education will be removed.

12. The winter will be the season most favourable for the literary instruction of the children; as then they will have but few necessary avocations; perhaps no more than will occasion that degree of exercise which the preservation of their health may require. But their learning need not be wholly interrupted in summer. Every morning the boys may spend two hours at school, and be ready to go in the field to work by eight or nine o'clock. And when they go out, the girls may enter, and also spend two hours at school. Again at one o'clock (if they dine at noon) the boys may attend the school, continuing there an hour and an half, or two hours; and the girls may succeed them, as in the forenoon, attending the school a like length of time. Thus the same master might every day teach both girls and boys; and yet, in the whole, not to be confined above seven or eight hours in a day.—An hour every evening might be allowed the children, to amuse themselves in innocent sports.

13. The employments of a country life are so congenial to the human heart, the master of this rural academy could hardly forbear to engage in them, in the intervals between school hours. He would naturally be led to read the best authors on agriculture and rural affairs, and to get some acquaintance with botany. He would study theories, tracing useful practices back to their principles; and thus be able to communicate to the elder boys, or youth, a degree of scientific knowledge of the very important art of which, in the field, they daily learned the practice.

14. I hardly need mention, what ought to be an indispensable part of education in every literary institution. That the children at this rural academy would be taught the plainest and most important principles of religion and morality.

15. It is to be presumed that the abler farmers would continue their children at school till they should be fourteen or fifteen years old. These children of both sexes, might make further advances in learning. They might study geography, and read some instructive histories, particularly the history of the United States, and a few of the best English moral writers, in prose and verse, At the same time they might learn so much of book-keeping as would be useful in the country; and the boys might be taught geometry, practical surveying, and the principles of mechanics.

16. Perhaps some useful manufactories might be established, in which the children, both male and female, might be very serviceable.

Such an institution as that here sketched out, need not be confined to frontier settlements; tho' the first idea of it was suggested by a reflection on their situation. Rural schools, or academies, upon such a plan, would perhaps be the most useful that could be established in the country towns and counties of this and every other state in America. Numerous advantages would result from them. I will hint at a few.

1. The children would be taught the plainest and most useful principles and rules of religion and morality.

2. They would be well and uniformly educated in the most necessary learning, and in the most important arts of civil life, **husbandry** and **domestic economy**.

3. They would acquire habits of industry.

4. Their manners and behaviour would be formed, and rendered mild and agreeable.

5. A few successive sets of scholars thus educated, returning to their several homes, would quite change the face of the country, in point of cultivation, and introduce a pleasing change in the knowledge, manners of the people, and abolish the invidious distinction of citizens and clowns.

I have been rather amused in reading Professor Will Monroe's account of the manual labor schools, which is to be found in Paul Monroe's Encyclopedia of Education, in tracing the sources upon which he drew, and in comparing the date of the Columbian plan with the birth-date of the Fellenberg Institution at Hofwyl. It occurs to me that Professor Monroe has recorded the German notion of the influence of Hofwyl and that when he had combined with a translation of an article written by a German what appears in a somewhat later article by Barnard, he had exhausted his sources of supply. In this connection it is worthwhile to note the date upon the tomb of De La Howe, the absence of all mention made of Fellenberg's name in the literature of the earlier manual labor schools (Maine Wesleyan, Maryville College, etc.), the scant mention made of him in the only institution in this country which bore his name (Fellenberg Academy, Incorporated 1832), and the fact that the earliest articles published in America were those in Woodbridge's *Annals of Education*—long after our earliest schools were established.

That neither Woodbridge nor his successor, Barnard, had first hand information about the De La Howe School is beyond question. As a matter of fact, over thirty years after De La Howe died, Woodbridge wrote: "We find from the *New York Farmer,* that a Mr. De La Howe, *lately deceased* in South Carolina, has made provision in his will for the education of twenty-four poor children, twelve boys and twelve girls." It is more striking, perhaps, to call attention to a more recent study of the manual labor school movement—a movement which the author, Professor Herbert G. Lull,

states "began about eighty years ago and lapsed about sixty-eight years ago." The curious thing about this study is that no document earlier than 1857 is cited as authority for the statements made. (Cf. Am. Annals, 2:255, April 15, 1832; Lull, H. G., Man. Trg. Mag., June, 1914, pp. 375-88.)

The 24 children mentioned in the *New York Farmer* were to attend a school which had a definite curriculum and a more definite aim. In no uncertain terms a clause in the will declares that the trustees shall "raise useful citizens to the state many whereof would, without such an institution, be a nuisance."

Very recently an able jurist declared with all seriousness that he had come to the conclusion that the courts of the early days were constituted merely for the purpose of defeating justice. The South Carolina Agricultural Society, tired of litigation over the will of De La Howe, resigned its trust in 1805. For years the estate was indifferently administered in a business way and contrary to the declared purpose of the testator. Yet it is a source of deep satisfaction to the descendants of the early settlers near Willington to now view the wonderful work that is being carried on by Superintendent J. B. Branch at the reorganized Pioneer Manual Labor School. Anyone interested in the history of manual education in this country may read with interest an article which was written by Mr. Branch and which tells about the later career of De La Howe.[2]

During the next ten years, there will be a great number of colleges whose alumni will celebrate their one hundredth anniversary. In the chronicles that are now being written to commemorate the day of foundation I am much aware that there are many references to manual labor departments, to the struggles of students who were trying to solve the problem of how to secure an education and at the same time support themselves, and to brilliant, far sighted men who believed, as we believe, in the efficacy of manual education.

The "Significant Historical Attempts" listed here should include mention of the fact that, in 1831, Theodore Weld, one of the "Fathers of the Manual Labor School Movement," made the first educational survey on record and published a part of his findings. (Cf. Report of the Society for Promoting Manual Labor in Literary Institutions, New York, 1831.)

[2]Branch, J. B., **The Latest Experiment in the Social Laboratory**, Quar. Bull., State Bd. of Public Welfare, Columbia, S. C., Nov., 1920.

Industrial Arts Sketching — Part V*

PICTORIAL METHODS

Carl L. Svensen.

PICTORIAL methods of representation lend themselves to many purposes. Methods of pictorial representation include perspective, isometric, oblique, cabinet, diametric, and various modifications. Under usual conditions, where comparatively small distances are involved, perspective sketches need not be used. Some form of isometric or similar methods, requiring only a few simple rules, are sufficient for many purposes.

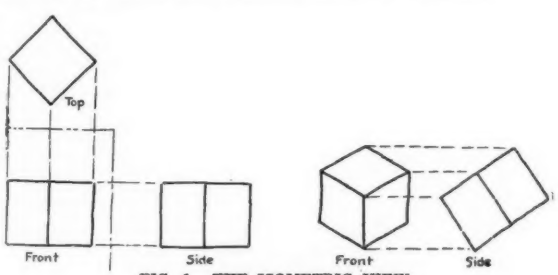

FIG. 1. THE ISOMETRIC VIEW.

By pictorial methods, views from three directions can be shown in a single view. Such sketches are not to be considered as having the value of orthographic views and should not be used in place of them. Their greatest value is the help which they afford in explaining details and arrangements difficult of comprehension when shown by orthographic projection.

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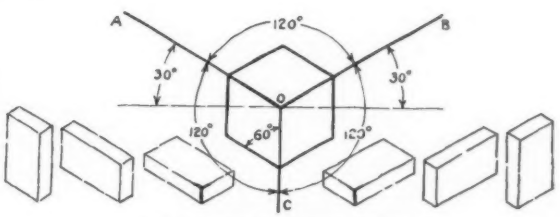


FIG. 2. THE ISOMETRIC CUBE.

Some of the uses of pictorial sketches may be listed as follows:

1. For making shapes and details clear to those who cannot easily read ordinary drawings.
2. As a quick means of working out or recording one's ideas.
3. As a means of representing objects difficult of comprehension when shown by orthographic views.
4. In reading drawings, as a means of making certain of one's own interpretation of a part or construction.
5. For determining the position of belting, pulleys, wiring, piping and other space constructions.

The principles of isometric views can be understood by reference to the representation of a cube in Fig. 1. At the left the front view shows two faces of the cube. At the right the front view shows three faces of the cube equally. Such a front view is an isometric projection of a cube. The lines OA, OB, and OC of Fig. 2

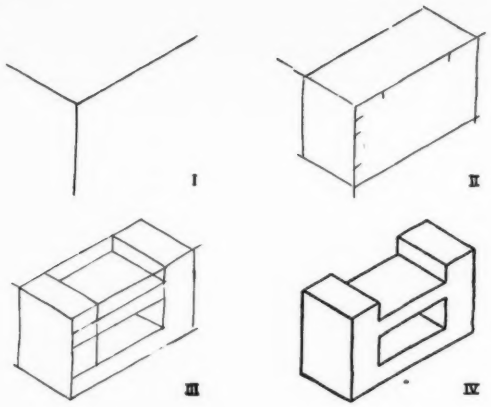


FIG. 3. MAKING AN ISOMETRIC SKETCH.

represent three edges of the cube and are called isometric axes. They form three angles, each of 120 degrees. Two of these axes make angles of 30 degrees with the horizontal. Distances are estimated along, or parallel, to the three axes.

The first step in making an isometric sketch is to locate the three axes as at I, Fig. 3. Then estimate distances along the axes and sketch lines parallel to the axes, as at II. Locate any details in a similar manner as at III, and then brighten up result as at IV.

The axes may be placed in different positions, provided the angles between them are kept in mind, as illustrated in Fig. 4. The arrangement to be used is the one best suited to the representation involved.

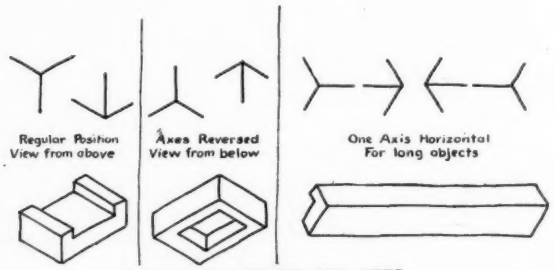


FIG. 4. POSITIONS FOR AXES.

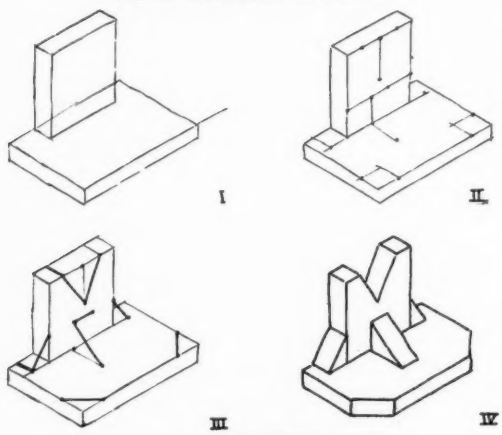


FIG. 5. NON-ISOMETRIC LINES.

Lines which are not parallel to the three axes are called non-isometric lines. Their position is fixed by locating two points, generally the ends of the lines. This is illustrated in Fig. 5. Sketch the isometric axes and block in the isometric lines as at I; locate the ends of the slant or non-isometric lines as at II; join the ends as at III; draw the necessary parallel non-isometric lines and complete as at IV. Angles are treated in the same way by locating the lines which form them. This is necessary because angles do not show pictorially in their true size. This is evident from an inspection of the cube in Fig. 2 where some angles show 120° and some 60° although on the actual

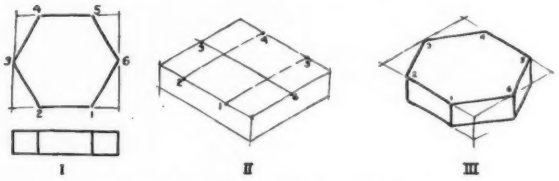


FIG. 6. CONSTRUCTION FOR ANGLES.

cube they are all 90°. The method of sketching angles is shown in Fig. 6. First make orthographic views and then transfer by taking distances parallel to the axes.

When circles occur they appear as ellipses on isometric views, as illustrated for three positions in Fig.

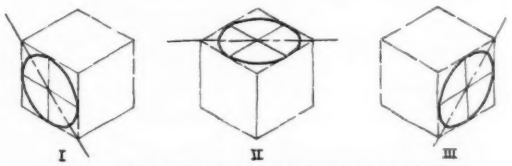


FIG. 7. THE CIRCLE ON ISOMETRIC SKETCHES.

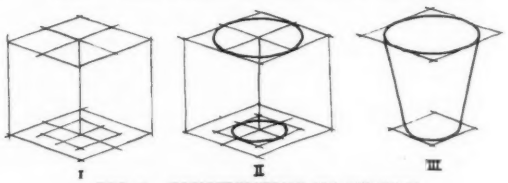


FIG. 8. CONSTRUCTION OF CIRCLES.

7. Note the directions of the long axis of the ellipse in each of the three cases. The method of blocking in for isometric circles is shown in stages in Fig. 8.

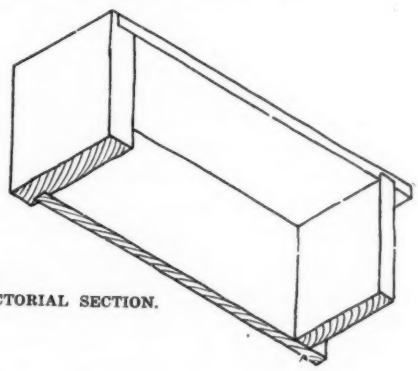


FIG. 9. A PICTORIAL SECTION.

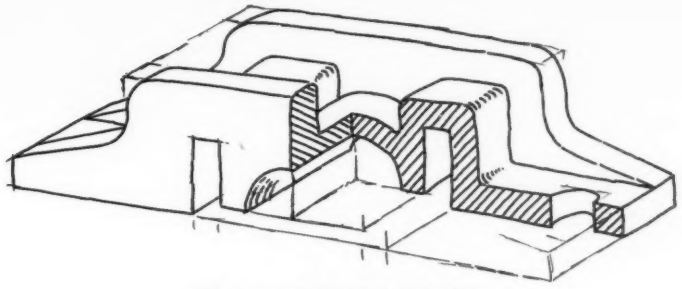


FIG. 10. A PICTORIAL SECTION.

Curves can be estimated or plotted by locating a series of points. A few points are generally sufficient for sketches.

Interior construction can be shown pictorially when desired. The cutting planes are taken parallel to

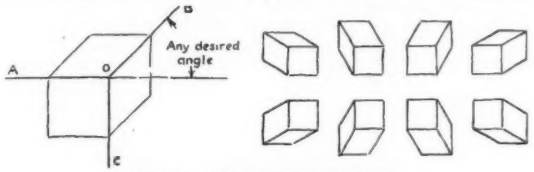


FIG. 11. THE OBLIQUE CUBE.

the faces of the isometric cube. Half of the object may be cut away as in Fig. 9, or one-fourth as in Fig. 10.

Oblique views are very easily sketched for such conditions as can be well represented by this method. They are obtained by using projecting lines which are oblique to a plane instead of perpendicular as in orthographic projection. The resulting view for a cube is shown in Fig. 11. Note that one face of the cube shows in its true size and shape, and that lines perpendicular to the front face are oblique.

The three lines which meet at "O" are called oblique axes. The axis "OB" may make any desired angle with the horizontal, either to the right or left. If one face of an object is parallel to the front face of the cube, it will show in its true size and shape. Other than this, the methods already explained for isometric views, may be followed in making oblique sketches.

The axes are the first lines to be sketched, Fig. 12 at II. Then lay off the horizontal and vertical distances for the front view along axes OA and OC, and thickness along OB as at III. Sketch lines parallel to the axes. In the same way, lay off and sketch the details, completing the view as shown at VI.

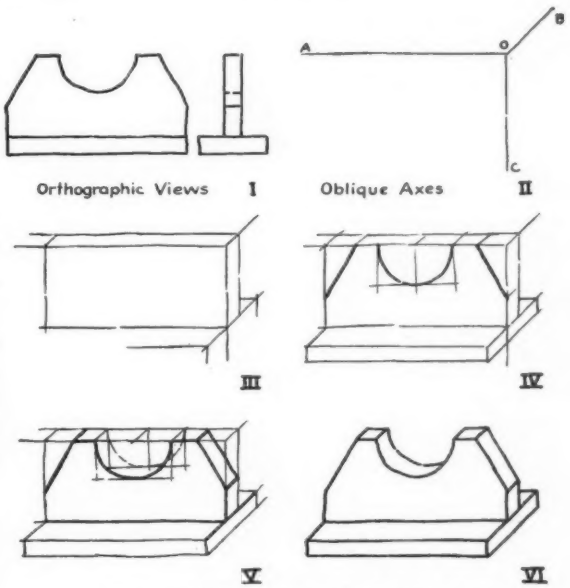


FIG. 12. MAKING AN OBLIQUE SKETCH.

Angles and circles show in their true form when parallel to the front plane. In general they should be placed so that they will have this position. When circles, curves and angles occur in an oblique plane, the

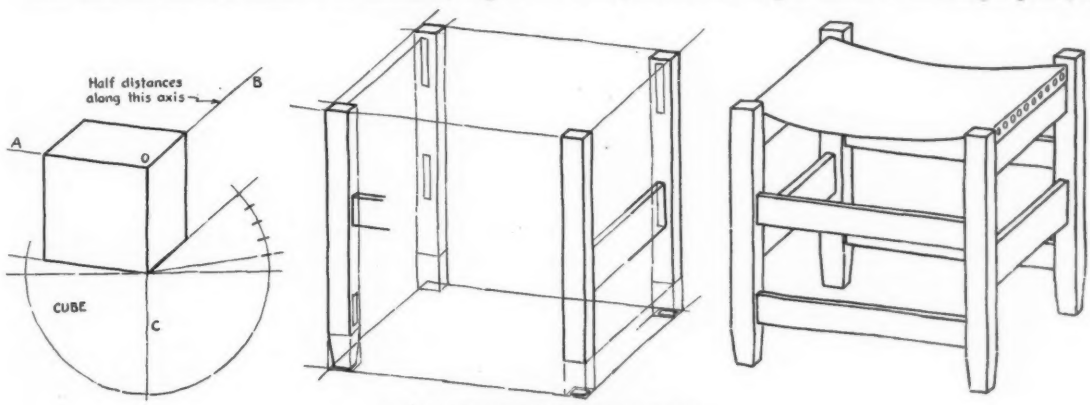


FIG. 15. DIAMETRIC STYLE SKETCH.

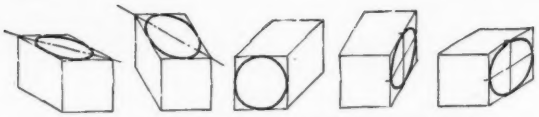


FIG. 13. THE CIRCLE ON OBLIQUE SKETCHES.

methods are similar to those explained for isometric sketches. The construction for circles is shown in Fig. 13.

Other pictorial methods can be readily understood by reference to the illustrations. A cabinet drawing, Fig. 14, has distances along the oblique axes reduced to one-half while the two perpendicular axes are made the full distances. A pleasing result is often obtained by this method. In some cases about three-fourths of the full distance may be taken along the oblique axis.

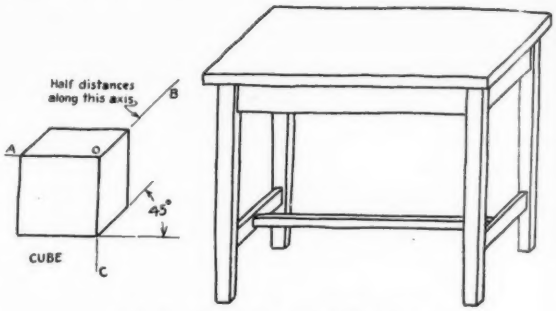


FIG. 14. CABINET STYLE SKETCH.

Another method is to use axes as in Fig. 15 and estimate half distances on the steep axis.

(To be continued)

Organization of a Course in Pattern Making[1]

Howard G. Olivit, Instructor of Trade Pattern Making, East Technical High School, Cleveland, Ohio.

WEBSTER defines a pattern as "a model for making the mold into which molten metal is poured to form a casting." Pattern making then, is the art of constructing the model for making the mold in which the casting is formed. A pattern is usually made from a sketch, drawing, or sample casting, and must be constructed with due consideration to modern molding practice.

In the organization of a school course in pattern making, there are certain basic fundamentals which must be taken into consideration, in order to make the work valuable as a contributing factor in the formation of those habits which man must necessarily possess, in order to become efficient and helpful in any pursuit which he may follow. I refer to those habits of analysis, precision, decision, neatness, accuracy, reserve, caution, and compatibility, and the transfer of these habits to various other interests. After 25 years of experience in the art of pattern making, in all its various phases, under a variety of conditions, influenced by extremely different aims and environment, I believe that the organization of a course in pattern making which will include the above results in habit formation is possible. If this is so, and I feel certain it is, then I believe that the content and purpose of the course is of more value and importance to the high school boy, than some other subjects which are now being taught in the usual high school curriculum.

In the first place I believe the time to present the principles of pattern making, is in the second year of high school, commonly known as the tenth grade. By this time the boy should have had at least a year's acquaintance with the school shops, the various tools, use and care of tools, and so on. Unfortunately, however, his work has too often been what might be called "individual project work," something he has been allowed to make for himself as a result of a personal desire, and too often this has been anything from a child's rolling pin to an elaborate china cabinet or bookcase; too big a job, with a consequent tax on the boy of too much time involved. He gets tired of his job, and very often is allowed to give it up, or more often is forced through lack of time to drop it, or if he is told he must finish it, he either becomes careless on the job, or "soldiers" or both; at any rate he loses interest. Inevitably the result is that his conception of pride is permanently weakened; his ideas of accuracy are nil; his effort has been half hearted, and his respect for the importance of carrying a thing through to its completion has been seriously injured. Take a class of thirty boys in the beginning of their tenth year; give them the tools necessary, and a piece of pine lumber four inches square by seven eighths of an inch thick. Tell them to make this piece three and a half inches square by three quarters of an inch thick. I'll venture that not more than twenty per cent will make the piece square and to size. At least 24 of these boys are either careless or incompetent to this degree.

By the time our boy has reached the tenth grade he has had, along with his shop work, probably four or six periods per week in mechanical drawing. Assuming then that he has learned at least a few of the elementary principles of blue print reading, I would start my course in pattern making by insisting that each boy have a blue print, by stressing the importance of *using* the blue print, and by impressing on him through an analogy of some sort, that it is technically wrong and improper to try to work without it; in short that memory is a poor substitute for a drawing, and that the pattern is not the ultimate result of his labor, but is simply a means toward an end. Next in importance is accuracy. The library table that the boy made can still fill its place in the living room even though it is 47 inches long when it should have been 48 inches; or the

[1]Copyright 1924 by Howard G. Olivit.

tie rack that hangs on the wall in father's room functions just as well at 19¾ inches long when it should have been twenty inches. But if he is going to make a pattern for a connecting rod or for a piston for his "flivver" he must remember that the interdependence of parts is of vital importance, and that unless his patterns are made to measurement they will not fit in with the scheme of things and are, therefore, useless.

These first two principles, if properly carried out, will go far toward encouraging the third important requisite which is neatness. Look about you in the street cars or anywhere that the crowds congregate, and watch the careless, indifferent men, untidy in appearance, without any apparent goal in life, and you'll see a sample of the boy whose habits of neatness and accuracy were not correctly formed or were neglected entirely, and the boy who was never trained to do one thing well, and to *finish* it. These three things then, blue prints and their proper interpretation, accuracy, and neatness, together with that quality which I will call completeness, must be considered first. Wrapped up in these essentials come many others such as shrinkage, draft, center lines, finish, principles of molding and so on which we will consider briefly.

After the metal is poured, and while it is cooling, there is a chemical action taking place which renders the casting smaller than the pattern. This is known as shrinkage, and an allowance must be made on all patterns to compensate for this shrinkage which always occurs to a greater or less degree, depending on the kind of metal and size of the casting. Shrinkage then is an allowance on the dimensions of a pattern to make up for the contraction of the metal as it changes from liquid to solid.

Draft should be considered next and may be defined as a slight taper put on the sides of a pattern to facilitate its removal from the sand. Draft may vary in proportion to the depth of the draw. Usually a taper of one-eighth of an inch in twelve inches is sufficient, which is a trifle less than an angle of one degree.

Next in importance is finish, which may be described as an allowance on certain surfaces of a pattern, so that these surfaces on the casting may be machined to their correct size. It is allowed only as designated on the drawing by a small italic letter *"f"* and only on the edge view of the surface to be finished.

Center lines should be the next consideration and may be explained as being the foundation from which we work, or the starting place from which we make a layout. As drawings are seldom made full size, but are usually made to scale, and as shrinkage changes the size of the pattern over the size of the drawing, a full size layout or reproduction of the shape of the pattern, made with proper shrinkage allowance, and showing finish added, is necessary and is next in order.

Up to this point in the course I have considered the foundry but slightly, and have now reached the place where foundry practice and the elementary principles in pattern making as applied to foundry must be taken up. It is not my purpose in this article to elaborate on foundry practice, nor to do more than very briefly touch just a few of those principles which are correlative to foundry and pattern shop. Under the headings given thus far, there will probably be three or four patterns. These should embody the features mentioned, taken in their order as given, and will all be made in green sand. We have not, however, considered cores as yet, either in green sand or dry sand. Next then I would include a pattern with a hole in it that would leave its own core; preferably a tapered hole. This provides a new feature in foundry work and might also include the turning of a boss, which would provide something in face plate turning on the lathe.

Next let's have something in the way of an irregular parting, a lever of some sort in order to bring out more forcibly the need for occasional coping down in the mold, and something that will include a good example of elliptical paring. Then I would suggest a parted pattern of some sort which would show the need and use of dowel pins, the advantage of a parted pattern over a solid pattern, and I would include in this a balanced dry sand core. This would require the use of core prints and the construction of a core box, and I would put two boys on this pattern; group the class in pairs and give each couple the responsibility of producing the completed pattern, which, of course, includes the core box. You will find that many amusing complications will arise which will tax not only your patience, but your ability as a teacher as well, and it will also serve to strengthen those habits of compatibility, caution, precision and so on, as before mentioned.

If there is a foundry in connection with your school, so much the better. The "proof of the pudding is in the eating," and the proof of the pattern is in the molding. You can have your class alternate between foundry and pattern shop, the length of time depending on various factors such as, extent of the course, length of the term, size of the foundry and so on, or you can have the entire class go to the foundry for a definite period of time, my suggestion would be two weeks or not longer than three. If you have no foundry in connection with your school, build yourself a molding bench; every up-to-date pattern shop, whether school or industrial type has a molding bench whether there is a foundry in connection or not. Provide your molding bench with a twelve or fourteen inch flask, a one-fourth inch mesh riddle, two rammers, slick, shovel, parting sand, and so on, and demonstrate the molding of each pattern to your class. When your bench is not used for molding, put the top back on and use it the same as your other benches.

In the course I have described, you are not turning out finished pattern makers nor molders, and I claim that you can teach all the foundry practice necessary for a high school course, right in your pattern shop.

This, of course, means getting your castings for your machine shop outside, but that is another matter. I do not mean to infer from this that the foundry as a part of your teaching machinery is not an important essential; it is practically indispensable, but in a small school is not always available.

An efficient course in pattern making does not depend on the number of problems included, but more especially on the successful teaching of those elementary principles as mentioned, and if you would have your boys finish an ordinary nineteen week term and take with them some of the real helps that I have mentioned, give them about five or six problems; include in each problem at least one new feature; give them in the order of their importance; and divide your problems into any number of lessons covering the time involved.

Finally I would say, that there is no branch of mechanical work which so clearly shows the importance of the correlation of the drawing room, pattern shop, foundry, and machine shop, and the closely interwoven dependence and necessity of each, the dignity with which each one should be regarded by the other, and the need of habits of compatibility and tact (for the pattern shop is the place at which criticism is usually aimed, and to which the "buck" is usually passed) as does pattern making.

I have purposely refrained from specifying any particular patterns in this article, believing that the course as here given could be used in almost any high school anywhere, the problems involving the various features as given, to be picked out by the individual instructor.

A New Emphasis in Art Teaching

Charles DeGarmo and L. L. Winslow.

IT IS scarcely necessary to call attention to the importance of art as a controlling factor in industries in which design is involved and in which the art element enhances the salability of the product. Even in instances where salability is not conditioned by the esthetic quality, art is generally employed in advertising the product. Consequently art is coming to command more and more the attention of the manufacturers and consumers of industrial products, and a renewed emphasis is being placed on art instruction in the schools.

Industry is interested in art from the commercial side primarily, and seeks to obtain designers, artificers, and artisans who can produce salable products. Manufacturers hesitate to place on the market products that may not appeal to the average buyer. They fear lest they shall over-reach the public taste. Although they employ trained designers, they frequently decline to put on the market the best designs that are produced. It is often the manufacturer's opinion that the designs which are best esthetically will not be appreciated and accepted by the public at large. They fail to take into account the fact that the taste of the consumer is often superior to their own.

The household is interested in art from the utilitarian and decorative sides primarily and seeks to employ art in producing or procuring beautiful homes, beautiful furnishings, utensils, and clothing to the end that life may be fuller and richer for all. To the modern household the selection and arrangement of manufactured products in the home is of the utmost importance, and it is, therefore, with the setting up of esthetic ideals and the judging of products with reference to these that the household is primarily concerned. It is to be regretted that many of the best designs turned out by the designers must be rejected or ruined by modification in order that they may meet the requirements of manufacture by modern mechanical means. The problem of designing for the household cannot be solved by industry alone. It is apparent to all who have given it more than a passing thought that the problem can be solved only through educational agencies in which the industries, the homes, and the schools are concerned.

It might be assumed that any product that deserves the adjective *good* is by virtue of that quality necessarily beautiful or, as we are wont to say, artistic. But there is a wide margin between workability and artistic excellence, for the design of a chair might, in a sense, be termed *good* if the chair was strong enough to support the weight of a person. Yet this same design might be deficient in almost every artistic excellence of form, finish, color, and material. The same is true of every other article of utility. Consequently we should consider no design adequate until it is artistic. We must hold, moreover, that an enduring and workable sense of the beautiful is acquired by the mind only as it invents and constructs or selects and arranges things having artistic value.

Some one may object that a true sense of what is beautiful in things and in their arrangement is an inborn gift rather than the result of education. Perhaps this is true for a few individuals and in a few particulars. Some people appear to have an innate sense of the beautiful in color combinations, and they sometimes appear also to know instinctively when forms and arrangements are good; but such talent is rare, even in its most elementary aspects. Only when these gifts are cultivated and trained do they produce the art critic or the artist. Art education is necessary for artistic discrimination and artistic production alike.

One purpose of art instruction is to acquaint pupils with the reasons why a design is in itself beautiful or not, and why under given conditions of arrangement it is in good or in bad taste. Reasons should be emphasized, because, though it is good to know that a certain

design or arrangement has or has not artistic merit, it is better to know why; a reason that fits a single case will fit a multitude of similar cases. It is more desirable to know why a product or an arrangement is artistic than it is to know the fact that it is so, because the fact is limited to a single instance and is individual, whereas the reason applies to many cases and is general.

If it is granted that all people have capacities for artistic judgment that may be developed by instruction, and that a trained artistic sense adds to one's personal happiness, making life deeper, richer, and more worth the living, then it becomes the duty of every citizen to insist on the best-known methods of art teaching in the education and training of our youth.

The method of teaching employed should be modern in that it should portray and exemplify the change in artistic ideals that arises when means of manufacture are revolutionized and perfected and when the persons concerned cease to be divided by class distinctions and become united. We can scarcely hope to be truly democratic until our democracy has become artistic as well as political and social. We cannot become really progressive in the industrial and the household arts until these modern means have replaced the archaic opinions that arose out of social and economic conditions totally different from our own.

The Renaissance led us to believe that no object should have just claim to beauty unless its singularity and uniqueness should reflect the personality of its maker as does a painting, a poem or a musical composition. Such an ideal becomes futile when the machine is brought in to reproduce a given design indefinitely. The design may be as beautiful and original as possible; yet an object which is reproduced thousands of times must necessarily lose the uniqueness that is possible in a painting or a statue which has no duplicate.

Is it not strange that some of our modern art ideals are as old as those held by the Greeks, who taught that beauty arises from the qualities of objects themselves rather than from any reflection of the personality or the emotion of the artist? Some forms of artistic expression like painting, poetry, and music have truly a place for the subjective and the unique, as has craftsmanship in a less degree. In the products of modern machine manufacture, however, this element must be confined largely to the original design, since the subjective uniqueness disappears in due proportion as production is multiplied. Whether we like it or not the machine is an economic and a democratic necessity. The designer in so far as the esthetic qualities of the product are concerned, has become more important than ever before in the history of the world in spite of the fact that there is less opportunity than formerly for the expression of individual fancies and caprices along creative lines. He must now concern himself with the more genuine beauties that may be made to inhere in each product that the factory turns out. Thus we should eventually come to judge manufactured products on this basis of inherent art qualities. A fundamental knowledge of art principles possessed by all and the ability to apply these principles to modern products of utility is of the utmost importance in the education of all the people.

Motivating Industrial Arts

R. A. Plowman, Edinburg High School, Edinburg, Indiana.

THE career of Apple-Seed John has been heralded far and wide. Those altruistic motives that prompted him to plant the apple seeds did not induce him to return during the seasons of pruning, spraying, and even harvesting; and had it not been for the army of horticulturists that followed up the work, the results could not have been so well and favorably known.

Industrial arts as a part of the school curriculum became very widespread in a comparatively short time. The motives that prompted educators to introduce it into our schools have never been questioned; but there is a noticeable tendency toward a decline in the popularity of manual training as a part of the high school curriculum, especially in the smaller schools. This work has too generally dwindled down to a smattering of drawing and woodwork which is presented in such a formal and routine manner as to be almost devoid of attractiveness and utility. It is, indeed, not surprising to learn that such work has become unpopular among students, and that its value is being questioned by the patrons and supporters of the work. Here is a typical example of the too common tragedy of the school shop: John informs his teacher that he wishes to build a bookcase. The teacher is visibly puzzled. He makes a search through the little library of references, failing to find a stock illustration and description of the proposed project; whereupon he attempts to interest John in the construction of a match-scratcher or necktie-rack. This teacher later complains that John has a poor attitude toward his shop work and that to discipline him is getting to be a problem. Is it an exaggeration to say that John is a prospective recruit for the I. W. W.?

Fortunately, the remedy for this deplorable situation does not require greater expenditures for more elaborate equipment. What we must have is an adequate supply of resourceful, skilful, and interested teachers. The teacher must possess both initiative and energy if he is to gain and hold the confidence of the boys to the end that they may derive the proper benefit from the work. The present writer has devised a plan for motivating shop activities that has proven of great help in securing a desirable attitude toward the work on the part of the boys. The plan was worked out with

EXHIBIT OF FURNITURE MADE IN THE AUTHOR'S CLASS.

freshmen boys. They had a part in devising it. Each boy is allowed to elect the projects he wishes to work out. He draws plans for the work and makes a bill for all the material to be used. He is allowed to personally order and pay for these materials. He then lays out his work and completes it, keeping an account of the entire time occupied. This time is charged to him at the rate of ten cents per hour. The cost of the materials and the value of the time used constitute the entire cost of the project. The finished work is given an estimated value by the teacher, and a grade is given for the work commensurate with the character of the work done and the net profit made. Following is a copy of an account sheet used by the boys and teacher in these classes. These sheets are exhibited with their corresponding projects at the close of the school year. They afford a complete and concise record of the work done during the year.

MANUAL TRAINING ACCOUNT SHEET

NAME..... YEAR.....
PROJECT..... BEGUN..... COMPLETED.....

MATERIALS USED

Pieces	Thickness	Width	Length	Planing	Kind of Wood	Price

TIME USED

Mon.	Tues.	Wed.	Thur.	Fri.	Mon.	Tues.	Wed.	Thur.	Fri.	TOTAL

Cost of all materials used in making this project..$.....
Value of time used at ten cents per hour.....$.....
Entire cost of this project.....$.....
Estimated value of this project.....$.....
Profit or loss on this project.....$.....
DRAWING... WOODWORK... FINISH... GRADE....

NOTES BY THE STUDENT

.....
.....
.....

NOTES BY THE TEACHER

.....
.....
.....

Thus it is evident that the boys are constructively encouraged to select projects thoughtfully, buy materials with true economy, use their time advantageously and wisely, build their work substantially, and strive for the best possible appearance in finished product. In this plan is combined all the essential elements desirable in shop motives. Moreover, it establishes a near parallel to actual working conditions in everyday life. It is conducive to constructive resourcefulness and the formation of good habits at the proper time. It eliminates the shop discipline problem. It renders the teacher a co-worker with the boys instead of a dictator or boss. It tends to exclude those factors that contribute to the decreasing popularity of school shop work. If the school shop is to fulfill its mission with our school boys and merit the financial and moral support of the community necessary for its maintenance, it must be adequately motivated.

MULTIPLICITY OF AIMS IN JUNIOR HIGH SCHOOL MANUAL ARTS

In a recent paper, read by Mr. H. F. Rusch, superintendent of industrial arts of Oklahoma City, Okla., attention is called to the confusion in present aims and ideals of manual arts in the junior high school. Mr. Rusch points out that the early advocates of the junior high school strong arguments for vocational training for specific vocational ends. Thus we have a statement in 1921 by Mr. Charles A. Bennett to the effect that a survey of manual arts in junior high schools indicated the current theory that shop into the school. The city boy, in their estimation, required practical experience to give ballast to his education.

This general aim was followed in 1918 and 1919 by argued that manual arts in the school should bring students in close contact with life and bring the spirit of the manual arts should aim to give knowledge and skill which will function immediately as a vocation. The work should also function for vocational guidance. At the same time Mr. Bennett found on the part of a number of cities a decided opposition to this viewpoint on the part of some who desired to develop pupils in harmony with their nature, to become intelligent and efficient in the use of material things of modern life in whatever occupation they might decide.

In 1922, Mr. Kenneth V. Carman found the following statement to represent the views of a majority of teachers to whom he sent questionnaires: "The purpose of the work in these years may be stated as including values for increased practical efficiency and more intelligent citizenship; trying out of vocational guidance values; and values in concrete experience giving motives for an interest in the subjects related to wider vocational and social interest. To these may be added the specific training values for those who will enter industrial vocations. Here as in the elementary school, industrial intelligence, insight and appreciation constitute the largest values and these should not be subordinated to the mere manipulation of tools."

As recently as January, 1924, Mr. W. E. Roberts, director of industrial arts at Cleveland, Ohio, stated that in his opinion the primary object of manual arts in junior high schools is educational rather than vocational or prevocational except in the case of over-age and backward boys.

A study of some sixty cities showed twenty types of shopwork with a considerable difference of opinion concerning the establishment of unit or general shops. The actual subject matter and the conduct of the work vary from simple woodwork to vocational work in distinct trades. The conclusion of some casual observer is that major objectives of general education in the junior high school are best reached through working in the three fundamental occupational fields of woodworking, metal working, and printing.

A Survey of Home Mechanics

How the Junior High School Can Organize and Teach the Same

Francis E. Mack and Russell S. Read, Instructors, Manual Training, Junior School No. 1, Trenton, N. J.

IN previous times, education concerned itself primarily with the acquisition of facts. Today, the development of the efficient individual is its aim. In like manner shop work upon its inception concerned itself with the development of a high degree of manipulative skill—being purely manual—to the exclusion almost entirely of any mental training or cultural development. The aim was the *job*. Today the aim is the control of habits, attitudes, and standards which are the outcome of the job.

To prepare pupils to take their places in life, what better means can be found than to withdraw from life those activities and situations which are good, and embody the same into the curricula of our schools—teach children to do those things better which they will be certain to do. The shops, as an integral part of the junior school system should do likewise. And in what better place than in the home, may we seek those activities which make up the major part of life outside the school?

Convinced that there is a large and undeveloped field for the enrichment of our projects in the shops, and that at the same time we are in line with the newer psychology, a survey was made by the writers of the work attempted at home by boys. Several hundred boys of the seventh, eighth, and ninth grades were asked to write down some of the things which they had done at home in the line of repair work or new construction.

The results of the survey were enlightening, first, in regard to the types of jobs; second, the number of jobs; and third, the frequency of some of the jobs. We found that, with few exceptions, the seventh-grade boys performed those jobs which are of short duration, requiring not a very high degree of skill; whereas the jobs undertaken by the ninth-grade boys call for a higher degree of skill, require longer time, and in some cases, require the cooperation of others.

The classification, a copy of which is appended, demonstrated the need of eliminating many of these activities from the school shop: first, because they are of infrequent occurrence; second, because some are done well enough; third, because the nature of the jobs preclude their being done in the school shops; and fourth, because the boys are already receiving instruction in them in the course of the regular shop work. The remainder fall under such general heads as wood-working, electrical work, etc., and presuming the junior school has various shop units, such as wood-working, metal and electrical shops, the following jobs suggest themselves as such that require instruction, in order that they may do them better.

The list outlined on the first section of paper presents some thirty or forty activities which occur frequently, and which should require instruction. The problem in organizing the class is to incorporate the jobs into the course of study, so that the instructor may teach each job efficiently and with the least amount of waste time and energy.

II. HOME MECHANICS' JOBS FOR SCHOOL SHOPS.

Wood Shop—Repairing screens, making screens, hanging screen doors, repairing furniture, repairing locks, glazing, staining, varnishing, enameling furniture, enameling

I. CLASSIFICATION OF HOME MECHANICS JOBS PERFORMED BY BOYS

	Seventh Grade	Eighth Grade	Ninth Grade
Woodwork—			
	Repaired fence 11	Made a chicken house 6	Repaired fence 8
	Repaired door 6	Made a dog house 2	Repaired furniture 11
	Repaired porch 4	Repaired fence 8	Repaired locks 3
	Repaired screen 1	Repaired wagon 5	Repaired porch 8
	Repaired sash and cord 2	Repaired porch 2	Repaired wire screens 12
	Made a box 4	Repaired furniture 2	Hanging wire screen doors 14
	Made a wagon 1	Repaired locks 5	Repaired coal bin 6
	Made a boat 1	Repaired screens 8	Repaired express wagon 2
			Made chicken house 8
Painting			
	Painted porch 3	Painted door 6	Painted roof 8
	Painted fence 3	Painted canoe 2	Painted porch 12
	Enameled gas range 2	Painted roof 9	Gilded radiators 8
	Enameled doll's bed 2	Painted garage 2	Gilded picture frames 2
	Painted screen door 1	Varnished furniture 6	Enameled bed 6
	Glazed window 10	Whitewashed 6	Enameled bicycle 8
	Painted bicycle 2	Glazed window 16	Painted shelves 10
	Painted sled 2		Painted doors 6
	Varnished chair 1		Painted fences 8
	Varnished bureau 1		Glazed windows 12
Electrical Work—			
	Repaired switch 2	Repaired switch 6	Repaired light switch 8
	Repaired car wiring 1	Replaced fuses 2	Replaced fuses 8
	Repaired bell 5	Helped to wire 4	Repaired door bell 12
		Repaired bell 8	Helped put in light 4
		Replaced dry cells 12	Replaced sockets 4
			Radio work 14
Gas—			
	Replaced mantle 1	Replaced mantles 4	Replaced mantles 6
		Stopped gas leaks 4	Stopped gas leaks 4
			Put in gas fixture 4
Plumbing—			
	Replaced washers in taps 1	Replaced washers in taps 4	Replaced washers in taps 2
	Cleaned out waste pipe 1	Repaired leaks 1	Repaired leaks 3
Miscellaneous			
	Repaired bicycle 3	Repaired bicycle 6	Repaired bicycles 16
		Repaired door knob and latch 4	Repaired clock 2
		Sharpened tools 3	Sharpened tools 12
			Helped lay cement floor 4

bicycles, gilding radiators or frames.

Electrical Shop — Repairing switches, installing switches, installing plugs, wiring lamps, preparing plug, wire, and socket for an extension cord, replacing fuses, repairing bells (buttons, springs, replacing batteries, wiring), radio work.

Metal Shop—Replacing gas mantles, replacing gas tips, stopping gas leaks, replacing washers in taps, cleaning out stopped up pipes, thawing out frozen pipes, soldering holes in tin-ware, use of white lead on joints, repairing bicycles, cleaning spark-plugs, repair of latches, on doors, knobs, repair of express wagons, sleds, etc.

To illustrate one method of procedure, let us select the wood shop activities and organize them. First, certain parts of the shop are selected and conspicuously named, "Glazing Department," "Screen Department," etc. Each "department" is located so that a student or a group of students may pass from one "department" to another without confusion.

One method of starting the work economically is to start the class on its craft work or whatever the usual work may be; and then to withdraw a group from the class and give instruction to the group in one activity, e. g., glazing. In the meanwhile the remainder of the class proceeds with the regular work. As soon as this first group has completed the first activity it may be moved forward to the next activity and may be given a demonstration in that. As soon as the boys are well under way, select a second group and repeat as with the first. Continue thus, advancing the first group and following through with the other groups, so that finally several groups (the entire class) are moving along through these several home-mechanics activities. Eventually the entire class will have had instruction and experience in the correct way of performing all these activities.

As an aid to checking up on the various groups, a capable boy should be appointed as foreman, in charge of each group, and part of his duty should be to keep a record of the students in his group.

The one objection to this plan is that it requires frequent repetition on the part of the instructor, of demonstrations of the same activities. In a way this apparent drawback has its merits, as in smaller groups the individual students will have a better opportunity of witnessing the demonstration than they would if the job were given before the class as a unit. The boys are closer to the job and feel less formal. The big advantage is that confusion is eliminated and the disciplinary problem is reduced to a minimum. The class is started off on a regular job, and the withdrawals are made in small groups. The various departments are well organized in a brief time and the groups very easily fall into the spirit of the thing. Thus before long we have several groups, each with a leader, working on these various home mechanics activities.

In like manner the work may be organized and taught in the metal and electrical shops so that by the time the student has completed the circle of all the shops he has had instruction in, and opportunity to perform, all the home mechanics activities.

English in the Printing Trades School

John F. Locke, Department of Vocational Education, Cincinnati, Ohio.

ONE of the most important subjects under "related subjects" as pertains to printing, is English. It is one of the mightiest tools with which the apprentice can become equipped. As a matter of fact, the printing school is in reality the English laboratory. Under English the first thing that should receive consideration is the fundamentals of English grammar.

This part of the course can best be divided into groups, some of which should be subdivided so as to allow the whole group to be taken up as separate units of not too long length.

- I. Parts of Speech
- II. Nouns
  - a. Kinds
  - b. Declension-case
  - c. Gender.
  - d. Number
- III. Pronouns
- IV. Adjectives
  - a. Kinds
  - b. Comparison
- V. Adverbs
- VI. Verbs
  - a. Classification
  - b. Conjugation
- VII. Prepositions
- VIII. Conjunctions
- IX. Interjections
- X. Analysis of Sentences
  - a. Kinds
  - b. Construction

The lessons should contain a brief survey of the outstanding facts necessary to a comprehension of the ways in which words are related as to structure in sentences. No attempt should be made to present an exhaustive summary of grammar, but rather the instruction should show in a clear and *practical* manner how words function and what happens to them as they do their work in sentences. The apprentice should study words under the several classes to which they belong and the principal rules generally accepted as governing their use, noting as he goes along some of the errors common to each class. I have used the word "practical" in this paragraph, and its meaning is easily seen in a study of the examples given below. The ratio of the efficiency of any instruction in subjects related to a trade is dependent upon their being made practical to that trade.

The purpose of the study of language should be to acquire facility in the use of it, and the main efforts of apprentices should be directed to practice in construction rather than to finding defects in what others have thought out and expressed.

Objection is made by some to any presentation to the student of incorrect forms of language, and this might have more force were it not for the fact that he is exposed to bad usage, in some degree, every day. Many

students use incorrect expressions for years in entire ignorance of their incorrectness until confronted with them in the classroom. If, by the judicious use of such exercises, the student can be educated to become critical and observing, the instructor will do well to assign work of this nature. The student should be cautioned, however, against expecting that such work alone will give him much power in using language. The object of language should be the expression of thought in the clearest and most attractive manner. Where, to any greater degree, is this more true than in the many branches of the printing industry?

The instructor should take a small group and go over each lesson in a general way; describing, pointing out, and mentioning some of the principal things to be borne in mind. He should keep in mind both the aim of the lesson and the individual ability of the students. Following this the student can be left to study for himself, but constructive criticism by the instructor of the written work performed is absolutely essential. Each student should keep a notebook in which should be recorded the answers to all questions at the end of each unit or lesson, before beginning the next one.

Adjectives **Unit 115**

There are three degrees of comparison: positive, comparative, and superlative.

The positive degree is the simplest or regular form of the adjective and is used to express simply the quality or quantity; as,

He is a **fast** compositor.
Lead is a **heavy** metal.

The comparative degree is usually made by adding **er** to the positive degree. It is used for distinguishing between the quality and quantities of two objects or things.

He is a **faster** compositor than the other boy.
Lead is **heavier** than tin.

Note—The comparative degree refers to two things or pairs of things and distinguishes them from each other by implying that one has a higher or lower degree of quality or quantity. Adjectives in the comparative are almost always followed by **than.**

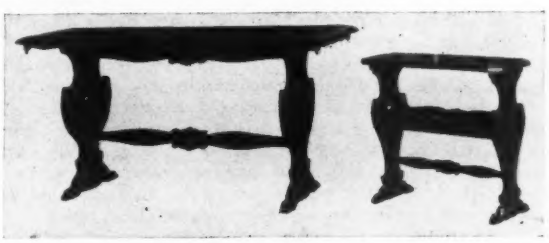
The superlative degree is usually made by adding **est** to the positive degree. It expresses quality or quantity in the highest or lowest degree and is used in comparing one object with several others, three or more.

He is the **fastest** compositor we have.
Lead is one of the **heaviest** metals in the world.

Fig. 1. A portion of the unit on comparison of adjectives.

Prepositions **Unit 110**

1. **Between** is generally used with reference to two persons or things; **among** with reference to three or more. However such expressions as "Putting spaces **between** the letters," and "Reading **between** the lines" are accepted as correct.



TABLES MADE IN THE FURNITURE DEPARTMENT OF THE MILWAUKEE STATE NORMAL SCHOOL. MR. I. N. MADSEN, DIRECTOR.

A PHONOGRAPH CABINET DESIGNED, MADE AND FINISHED BY A STUDENT IN THE VOCATIONAL SCHOOL AT ST. PAUL. MR. F. H. THOMAS, PRINCIPAL.

2. Study the following correct uses of prepositions:

He walked **into** the office. (entrance)
He walked **in** the office. (walking about)
I live **in** Cincinnati **at** Sixth and Cutter Streets.
The proof is lying **on** the table.
We walked **to** the station. (destination)
We walked **by** the Library. (on the way)
I agree **with** him. (persons)
I agree **to** his terms. (things)
Place it **behind** (not **in back of**) the door.
He was angry **at** the dog. (things)
He was angry **with** his neighbor. (persons)
The copyholder sat **beside** the proofreader. (by the side of)
Besides ability, a printer should have initiative. (in addition to)
The snow was cleared away **by** workmen **with** shovels.

Prepositions are often used needlessly. Study the following:

INCORRECT

Keep **off of** the grass.
The firman fell **off of** the ladder.
Place it **inside of** the border.
Where is the copy **at**?
What did you do it for?

CORRECT

Keep **off** the grass.
The fireman fell **off** the ladder.
Place it **inside** the border.
Where is the copy?
Why did you do it?

On the other hand, prepositions are often omitted when they are really necessary for effectiveness.

INCORRECT

That cut is no use.
We were away only a couple hours.
We were home yesterday
It is no consequence.

CORRECT

That cut is **of** no use.
We were away only { **a couple of** hours. / two hours
We were **at** home yesterday.
It is **of** no consequence.

Fig. 2. A portion of the unit on uses of prepositions.

Modern Methods of Process Color Printing

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PROCESS color printing is a term applied to various kinds of pictorial color printing produced from halftone plates. As a rule, these process engravings are produced from colored copy, or from objects, in such a manner as to reproduce the colored copy, or object, in its actual colors when the printing has been completed. These plates are made by the photo-engraving process, involving the use of color filters, screens of different angles, and other special apparatus.

In some instances, however, a set of process plates is produced from one-color copy, but in such cases the color values are added to each plate by highly-skilled photo-engravers who have been trained in this art. The finest results cannot be obtained from one-color copy, yet it must be admitted that remarkable effects are often produced from such copy. The vast majority of process color plates are produced, of course, from colored copy.

Right here it seems well to mention the fact that some few years back the finest process color printing was done in three colors—yellow, red and blue, a separate plate being used for each color. This three-color process was not found entirely satisfactory, however, in the reproduction of original oil paintings, water colors, or other fine colored subjects, so that in recent years the four-color process has been adopted in most cases for the production of the *finest* color pictorial work. By this process the printing is done in yellow, red, blue, and black from four separate engravings the "black" one being known as the "key" plate.

Although the four-color method is now being used for the reproduction of the most beautiful colored subjects, including reproductions of famous old masters, the three-color process is still used to a large extent for practically the same purposes. The comparatively new *two-color* process is also being utilized to no little extent for the reproduction of many different kinds of pictorial work, including illustrated advertising pages for magazines.

For the benefit of the reader who may not be fully acquainted with the methods of process color printing we shall first offer a few facts concerning the production of the plates: When halftone reproductions are to be made from paintings, water colors, textiles, rugs, flowers, or from objects of any kind in several colors, it is customary to have the photo-engraver make orthochromatic photographs from the colored subjects and then reproduce the detail of these photographs in halftone. Of course, a separate photograph is essential for each halftone plate, and each plate of a set is to be made through a screen having a different angle than that possessed by the other screens used in making the set. For example, in the case of a three-color job, the plate for yellow printing will be engraved with a screen intended for yellow printing, but the screen used in making the "red" plate will have a different angle of screen than that used for yellow, and the "blue" screen will have still another angle.

When the printing is done from these plates of different screen the fine dots of the halftones form different colors in addition to the regular yellow, red and blue. For example, halftone dots printed in the proper combination of yellow, red and blue form such colors as orange, grass-green, olive green, purple, violet, maroon, brown and many delicate tints. Now if the screen on each one of the three process plates were of exactly the same angle these additional colors and tints would not be produced in the printing. In process color work of this character, the printed sections of a picture which look like green are really a combination of halftone dots printed in yellow and blue; purple is a combination of dots printed in red and blue; orange is a combination of dots printed in yellow and red. Various other colors and tints are produced in the same manner, according to the manner in which the plates are engraved and the combinations formed by the halftone dots.

By the three-color process as many as eighteen different colors and tints in a finished picture are produced by only three colors—yellow, red and blue. The photographs from which the process plates are made are often taken direct from the object to be pictured, such as a basket of fruit, a vase of cut flowers, an art rug, a piece of colored fabric or a piece of hand-painted china. There are numerous advantages in having the actual objects photographed direct, particularly in cases where the most exact color reproductions are desired of such things as textiles, neckties, fancy confectionery packages, gloves, and tapestries. The art value of this process may be fully appreciated, when we realize that by means of it, faithful reproductions are made of original oil paintings, hand-colored prints, semi-precious stones, and rare minerals of the most delicate tints, all of these objects being photographed direct.

Now while it is true that practically any colored object—even an original old master, or hand-painted photograph—can be reproduced in its actual colors by the three-color process (three impressions in yellow, red and blue), the finished results will always be better if the subject is reproduced by the four-color process which is practically the same as the three-color process with the addition of the "black" key-plate. In the four-color process the key-plate, or finishing plate, is sometimes printed in dark gray, but as a general rule it is printed in black.

Both in the three-color and four-color processes the plates are made by two methods. The first method is the "direct," or photographing direct from such objects as a bunch of flowers, a necktie or a piece of colored mineral. The second method is to have a colored picture of the object painted and then to make the photographs for the plates from that picture. The great majority of colored pictures appearing in the large magazines, and printed either in three or four colors, have not been made direct from objects, but have been produced by means of colored paintings of the objects in question. One great advantage of the painted picture method is that the commercial artist when painting a picture can apply certain colors and tints, which reproduce perfectly and which eliminate certain other colors which would not photograph well.

When process color plates are to be made from such subjects as brick, stone, wood, tile, or similar materials, photographs are first taken of the subject; these photographs are then hand-colored so as to represent the exact colors of the subject, and then from these pictures are made the special photographs for the process plates. Work of this character is generally done for illustrated catalogs and advertising literature. For example, one fine catalog on concrete face brick contains many pictures showing the various colors of this brick being manufactured, all of these pictures printed by the four-color process.

Color photography has made rapid advancement within the last few years, and this art is now being used to some extent in connection with the work of making process color plates. An interesting use occurred recently. A new and beautiful steamship was to sail within a few days' time, and the owners wanted a souvenir booklet about the steamer printed in that short space of time. This booklet was to contain colored pictures of the new vessel's first cabin, ball-room, parlors, restaurant, and so forth. Price was not considered as the booklets were to serve a special purpose, and the circumstances were such that the orders for the plates and printing could not have been placed before the time referred to.

This problem was solved by means of color photography. First, an expert photographer was sent to the

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steamship with instructions to take the views required on specially-prepared color plates. The sets of four-color process halftones were then made from those plates. We have not the space here to give details about the practical methods of color photography but this case is mentioned merely to show its wonderful utility in relation to photo-engraving. The souvenir booklets were delivered on time, but without the aid of color photography in this case it would have been impossible to have the process color plates made at such short notice. Of course, the process plates could have been made from painted pictures, or hand-colored photographs, of the scenes wanted, but there was not sufficient time for making such pictures.

Color photography, when considered in relationship with three-color and four-color process printing, is particularly adapted to open air pictures, such as views of the country, mountains, and seashore. It is also a great convenience in making process plates of interior views of churches, hotels, theatres, or other buildings.

Two-Color Process Printing

The two-color process is being largely used in printing pictorial covers for magazines, and pictorial advertising pages for magazines. It is also used to no little extent in the printing of pictures for wall calendars, cardboard fans, street car cards, posters and broadsides. Moreover, it is being used in many cases for printing picture inserts for books, and pictures for catalogs and booklets. It is a remarkable process adapted to a variety of printed matter in cases where multi-colored pictures are desired with only two impressions.

By the two-color process, which means two halftone plates engraved expressly for the occasion, very striking multi-color effects can be produced by such combinations as black and orange, red and blue, yellow and blue, green and black, brown and green, black and green, orange and green, buff and black. According to the manner in which the plates have been engraved, any of these two combinations of color will produce other colors and tints in the printing. For example, the black and red combination will produce various shades of pink and brown (on white paper in addition to black and red. The red and blue combination will produce purple, brown, violet and other colors in addition to red and blue. The plates are made, of course, from colored pictures which have been painted in just the right colors for the subject. Brown and green are excellent for the reproduction of the average still life scene; red and black are appropriate for the reproduction of the average "girl's head" picture; the red and blue combination would give splendid results in an advertising page where a bunch of grapes is to be part of the picture. These are merely a few rough suggestions illustrating the advantages of the two-color process.

Two-color process plates are made in various screens according to the quality of paper stock to be printed upon. The plates for one prominent magazine are made in 110 screen (110 dots to the square inch). The two-color plates for the cover picture of another well-known magazine are made in 120 screen. The 150 screen is generally used where the printing is to be done on paper having a very smooth surface but a screen finer than 150 dots to the square inch is not recommended.

Methods of Printing from Process Plates

Process color printing is done on platen presses, cylinder presses and on sheet-fed rotary presses. It is not done, however, on the ordinary type of high-speed rotary press owing to the difficulty in obtaining close register on stock fed from the roll. Nor is it usually done on the smaller sizes of platen presses, for the reason that such presses do not usually have the fine color distribution (or inking system), essential for this kind of printing.

In every case of process color printing, the plate, or number of plates, should be mounted on solid base, and not on the kind of wood base that is ordinarily used for electrotypes. Any of the patented plate-mounting systems on the market may be used as a base; in truth, these systems are now used in most printing plants where process color work is produced on a large scale.

When a single pictorial subject is to be printed in two, three or four colors, and where the order is not large, the printing is done from the original halftone engravings. In such cases it is desirable to have the original plates mounted on lead blocks by the "Sweating-on" (soldering) method, or have them mounted on laminated board or cross-cut wooden blocks. The laminated board and cross-cut blocks will not warp, expand or shrink to any great extent under weather changes, and furnish a firm, solid base necessary for this kind of printing.

Where the run is to be a long one, and where electrotypes of the original will be required to print several duplicates of the subject on each impression, only *lead-moulded nickel-types* should be made from the originals, for the reason that the ordinary copper electrotype is not sharp and clear enough for the purpose. A lead-moulded nickel-type is made by moulding the original halftone in a sheet of pure lead, then in the electrotyping process depositing nickel on the face of the lead mould. A nickel-type of this character is as good, from the standpoint of fine presswork, as an original copper halftone. Another great advantage of a nickel-type is in the fact that the nickel will not be affected in any way by the chemicals in colored printing ink, something which cannot be said in favor of the ordinary copper electrotype.

The standard height of electroplates is .152 inch, or 11 points, and all *nickel-types* of process color plates should be made to this height. The patented plate-mounting systems are made to various heights, but the most popular height in connection with process color printing is .759 inch. This height will permit of two or three sheets of make-ready paper being placed between the nickel-types and the base—a method that is being followed by many cylinder pressmen. The .759 inch base and a .152 inch nickel-type makes a total height of .912 inch which is .007 inch under type-high but this height is of particular advantage in the case of nickeltypes having vignetted edges—edges which shade away from dark tones to pure white. Naturally, with the vignetted plates .007 inch below type-high on the press, the vignetted edges do not take as much ink as they would if the plates were mounted to type-high. This lower height allows for the most effective make-ready, including the regular overlays on the press, and make-ready between the plates and base.

Here it may be well to explain how several large publishing firms are producing long runs of four-color process work at high speed on two-color, flat-bed cylinder presses: This pictorial printing is of the finest quality, including reproductions of oil paintings and water colors. A run of more than 1,000,000 impressions is often made from a single set of nickel-types. The work is produced by the following method:

On a large size two-color cylinder press are placed *two* of the forms for the four-color job, each form containing eight pages of plates for a magazine. For example, on one two-color press will be printed yellow and red at one operation, while on another two-color press will be printed the blue and the black for the same job. Special process printing inks are used, made in such a manner that one color can be immediately printed over another without smearing. Thus the yellow and red forms are being printed on one press, while the blue and black are being printed on another, but at least 24 hours are allowed for the yellow-and-red sheets to dry, before they are again handled and put through the second press for the blue and black printing. On long runs of this class of work the plan is to start a press printing yellow and red about 24 hours ahead of the press that will print the blue and black of the same job.

The above-mentioned plan is also followed for two-color process printing with the utmost success, and in such instances the sheets are completed as they are delivered from a two-color cylinder press. A press of this

type is usually equipped with an automatic pile feeder and an extended automatic piling delivery.

As a general rule, when process color work of any kind (two-color, three-color or four-color) is run on a cylinder press, the press is equipped with an electric neutralizer, or an electric sheet heater, which is for the purpose of eliminating static electricity in the paper and preventing the printed sheets from offsetting. In most cases of process color printing, however, slip-sheeting will be found necessary to prevent offset, particularly in the case of high-speed printing when two or more colors are printed at one operation. The electric neutralizer, or electric sheet heater, on a cylinder press will be of great advantage, and on certain forms of color printing where the ink is not heavy, will make slip-sheeting unnecessary, but it is safe to say that the average job of process color work will require slip-sheeting. The larger publishers who produce a great deal of process color work for magazines have large stocks of special slip-sheets which are used only for process jobs. This paper is of a hard, smooth nature, something like an "oiled manila." It will not stick to the surface of the freshly-printed sheets, nor is it apt to scratch the printed surface as it is applied. Special slip-sheet paper of this character is used on "McKee" presses and other makes of sheet-fed rotary presses which print two or more colors at one operation. On practically all of the sheet-fed rotary presses the slip-sheeting is done automatically, and the slip-sheets remain between the printed sheets for at least 24 hours before being removed.

The necessity of allowing slip-sheets to remain between printed sheets for at least 24 hours can be fully appreciated when we consider either two-color or four-color process work done at one operation on a special sheet-fed rotary press. With either two colors or four colors printed as a complete operation the inks (or several different films of color) are naturally very heavy and "wet" on the surface of the printed sheets. To remove the slip-sheets from such printed matter before the inks have "set" and dried would be to scratch the printed surface of many sheets, and a certain amount of offsetting would surely occur.

The practice of "shaking out" slip-sheets from printed work is not good, even in the case of small-size sheets printed on a platen press, because the shaking out method may result in scratching the surface of the printed sheets. The safe way is to always carefully remove the slip-sheets, one at a time, and to stack up the printed sheets and the "slips" in separate piles.

Process color printing as done on sheet-fed rotary presses calls for the use of curved plates, and for the best results in work of this class the curved plates should consist of lead-moulded nickeltypes. Original copper halftones are never used on rotary presses. The well-known "McKee" press is particularly designed for process work and will print either two or four colors at one operation. This is called "wet" printing and can only be done with inks especially made for wet printing. The lead-moulded nickel-types of original halftones used on "McKee" presses are made-ready by a special patented process before the plates are curved, only a comparatively small amount of make-ready being done on the press.

The Make-Ready for Process Color Plates

The following technical information concerning the make-ready work for process color plates applies to cylinder presses as well as platen presses and automatic job presses. A great variety of process work, in two, three, and four colors, is now being done on automatic job presses like the "Kelly," for example.

One of the most important requisites in process work is good rollers. There should be a separate set of rollers to be used only for yellow, and another separate set for red ink only. The same set of rollers used for blue can also be used for the black. By having separate sets of rollers for yellow and red inks the cleanest process work is assured. In some of the larger pressrooms, where four-color work is being produced all the time, each color press is supplied with three fountains, one used only for yellow ink, the second used only for red, and the third for blue and black inks. This plan saves a great deal of time when a press is to be washed up for some other color—from black to yellow for example—as it will require several washings to perfectly clean a fountain for yellow ink that had previously been used for blue or black.

In the make-ready of halftone plates for process color printing two different kinds of overlays are being used, i. e., the regular, "home-made" overlay cut by hand from printed sheets of French folio, and the patented mechanical chalk relief overlay. However in the great majority of process color jobs the hand-made overlays are being used.

Every set of process color plates must be proved up for colors and register before the regular forms are imposed and sent to press. This proving is generally done on a platen press of the "Colt's Armory" type, and each plate is proved in various shades of color, or rather printed in different amounts of the same color, so as to obtain the best possible results in the completed subject. For example, the yellow plate for a four-color job is proved in such a way that by removing some of the yellow ink from the press for each succeeding set of prints, or by applying a little more of the yellow ink for each lot of printed sheets, at the end of the operation there will be say half-a-dozen different lots of sheets, one lot printed in a light tone of the yellow, another lot printed in a medium tone of yellow, still another lot printed in a heavy tone of yellow, and so on. The same method is followed when pulling proofs of the red and blue plates. Finally, after the various lots of yellow, red and blue sheets have dried, and after the most careful proving work has been done with the progressive proof sheets forming the yellow-and-red and the yellow-red-and-blue combinations, it is then possible to select from the entire collection the progressive proofs in color values which will give the finest result in the completed job. These progressive proofs are absolutely necessary as "color samples" when the regular forms of color plates are to be run on the press. In the case of a four-color job the complete set of progressive proofs to be used as samples for color and register of the plates should consist of the following: No. 1. Proof of the yellow plate in the right shade of yellow. No. 2. Proof of the red plate in the right tone of red. No. 3. Proof of the blue plate in the right shade of blue. No. 4. Proof of the black, or "Key" plate in the proper tone of black. No. 5. Proof of the yellow and red plates, printed in perfect register and in the right shades of yellow and red. No. 6. Proof of the yellow, red and blue plates, printed in perfect register and in the proper tones of yellow, red and blue. No. 7. Proof of the yellow, red, blue and black plates, printed in the correct register and in the right shades of color. Of course, all of the proving of plates must be done in the special process inks which are to be used for the printing of the regular job.

When a set of color plates is being proved on a platen press, it is well to pull impressions of each plate on sheets of French folio to be used for cutting overlays. These impressions should be printed in black ink rather than in colored ink, as the black will show all the detail of each halftone to the greatest advantage for make-ready purposes. When the proving is done on a "Colt's Armory" press it is an easy matter to print the French folio sheets in black, without washing up the press, simply by tripping the rollers; inking the halftone with a hand brayer, and repeating this operation a few times until five or six sheets have been printed. To make a hand-cut overlay there should be five or six impressions of each plate, and by printing these during the proving operation the overlays may be cut and finished before the regular forms of plates are ready for press. Or, they may be used later when the pressman receives the forms for make-ready. It will save time, of course, by having the overlays all ready for a form when it is to be put on the press.

In process color printing a separate overlay is essential for each color plate; that is, one overlay must be cut espe-

cially for the yellow plate, another is to be cut for the red plate, still another must be made for the blue plate, while one is also to be cut for the black plate. The overlays for process plates should be made just as carefully as overlays for the finest grade of one-color halftone printing.

An overlay for a process color plate is cut as follows: The five or six sheets of French folio containing an impression of the plate are to be used in making the complete overlay. One of these sheets is to serve as a "foundation" and upon the printed subject on this sheet are to be pasted in true register the various "cutouts" which are to make the overlay. From another sheet the main detail of the process plate consisting of solid "blacks" is carefully cut out with a sharp make-ready knife, and these "black" pieces are then pasted in their right positions on the "foundation." From still another sheet all detail of the subject distinguished as "black" and "dark gray" is cut out in a similar manner and these pieces are also pasted in their proper positions on the foundation, over the top of the first "black" pieces already pasted on. Next, one of the remaining sheets is carefully cut out with the make-ready knife so that all the "high-lights" will be removed from this sheet and thrown away. The remaining portion of this sheet is then pasted on the foundation over the other pasted pieces. Finally, from the last proof sheet all of the "high-lights" of the subject are cut out as before but along with them are also cut out all of the "light-gray" detail of the subject. The remaining portion of this sheet is pasted over the other matter on the foundation in close register, and the overlay is then ready to be placed on the press.

Before the overlays are placed on the press, however, an impression of the form is to be taken on a sheet of thin plated or coated stock; all weak spots or low places in the plates are marked out and "spotted up" with thin tissue paper on this sheet. This sheet is placed in exact position in the tympan on the press. Over it is then drawn another plain sheet of tympan paper; an impression of the form is taken on this, and to the printed surface of this sheet are to be attached the overlays for the plates. A strong manila "top-sheet" is then applied over this make-ready. Some additional make-ready may be necessary. As we have already stated, many pressmen place a limited amount of "spot-up" make-ready between process plates and patent base, in cases where plates are mounted on patent base. In the case of a form of process plates of the vignetted variety the most delicate kind of make-ready is essential.

One of the most important things in process color printing is to maintain a perfectly even color throughout the job. The pressman in charge of this class of work must continually watch the progress of a job, comparing the color of the printed sheets with the color of the sample-sheet at regular intervals.

As a general rule, nothing in the line of dryers or reducers should be added to process inks. These inks are manufactured exclusively for process work, and under normal shop conditions, will not "pick" the surface of coated, plated or enameled paper. On an occasion where it is necessary to mix a dryer or reducer with process ink, use only a dryer or reducer that is intended for process ink.

Construction of the Step-Down Transformer

E. W. Jones, Pittsburg, Kans.

(Concluded from August)

The Bell Transformer

A satisfactory construction for a small transformer, to operate a bell or buzzer system, or toy motor, or a spark coil on a stationary engine, is shown in Fig. 6. It consists of 2200 turns of No. 30 enameled magnet wire for the primary, and 150 turns of No. 20, cotton-enameled, for the secondary. The coil is 1½ inches long and ¾ inch square inside before taping. The core laminations, ⅝ inch wide and 8 inches long, are inserted until the coil is entirely full, and then are bent around tightly one at a time, lapped about an inch and cut off at the desired place. The transformer illustrated is good for 110 volts primary, 7 volts secondary, and 10 watts output. This form of core construction is not recommended for sizes above 20 watts capacity, as the laminations are difficult to handle.

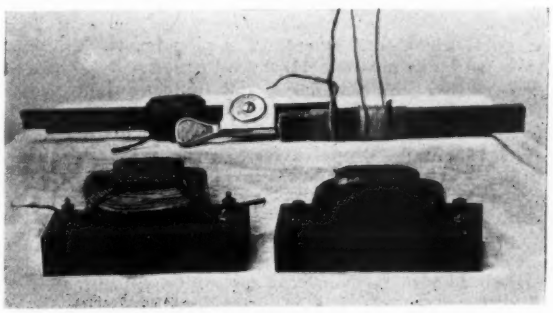


FIG. 6

Both windings in one coil. Secondary just started. Paper between the two windings is cut away to show primary of enameled wire. Inner lining of paper is wrapped directly on mandrel, with sheet iron strips underneath. Mandrel is long for chucking in lathe. A revolution counter is inserted in end of mandrel to record the turns. In the rear is a finished coil with laminations through ready for bending. In front is shown the last two steps, letting the core into the base, and completing the job by putting the leads down through holes in the base and connecting them to the heads of the terminal screws. Primary terminals are at one end and secondary at the other, with the respective voltages stamped in the base.

The Burning Transformer

A transformer built for lead burning on battery connectors is shown in Fig. 7. It consists of 172 turns of No. 14 DCC wire for the primary, and twelve turns of No. 10, doubled, for secondary. The core is 1¾ inches square in cross-section and the coil is 3½ inches long. The rating

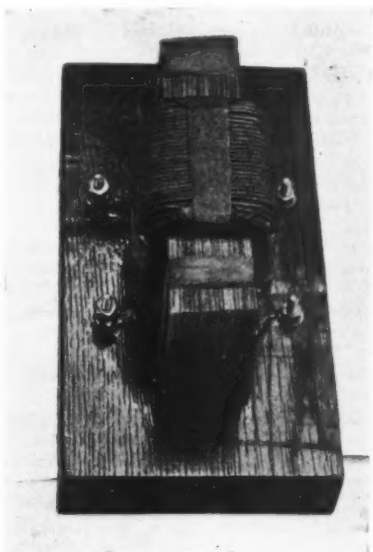


FIG. 7

A 400 watt, lead burning transformer, with primary and secondary on same side of core. Primary terminals are on one side of the base, secondary on the other.

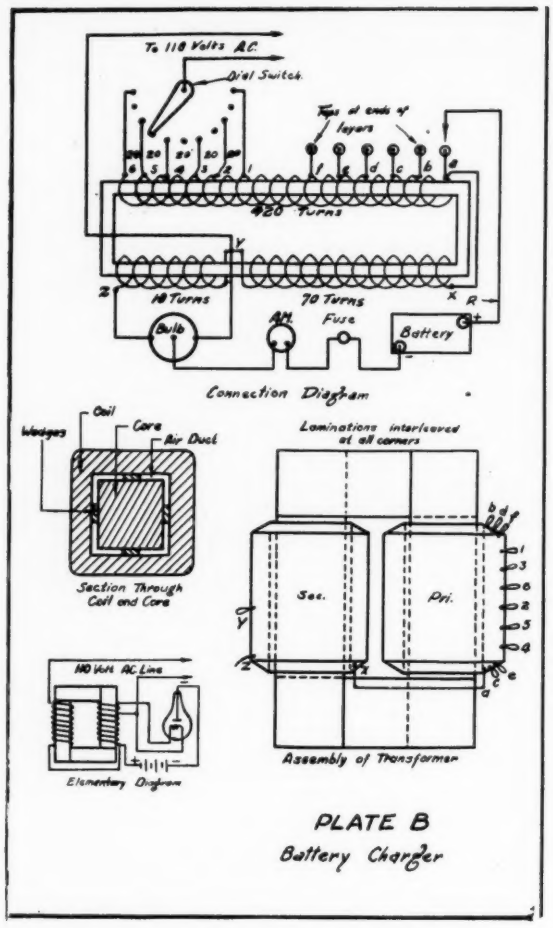


PLATE B. BATTERY CHARGER

is as follows: Primary voltage, 110 volts; secondary voltage, 7 volts; secondary amperes, 45 to 60. This transformer is suitable for arc welding on plates up to 1/16 inch thickness, and with metallic electrodes up to 3/32 inch diameter. The coated electrode should be used. About 2½ pounds of No. 14, double-cotton covered wire, and 1 pound of No. 10 double-cotton covered wire are required. The No. 10 wire should be doubled in the middle, and both strands wound on at once. The wood mandrel should be two inches square. A carbon electrode is used for lead burning.

The Battery Charger

This is an adaptation of the step-down transformer to the charging of automobile and radio batteries by means of the common type of tungar rectifying bulb now on the market. The transformer furnishes the low voltage for the battery and filament circuits, while the bulb changes the current from alternating to direct. See Plate B.

The construction of this transformer follows the general method previously outlined. It has the laminated core, ventilating ducts between core and coils, two windings on the secondary and taps brought out for various voltages. The primary and one secondary winding are joined in series at *ax* and the line current flows through both, but in opposite directions around the core. This is governed by the manner of assembling the coils on the side cores, turning one of them end for end if necessary. Begin the primary winding at *a*, and finish at 6. Bring out taps at *b, c, d, e, f,* at the ends of the layers of wire as the primary is wound. These are connected to binding posts and used for charging radio "B" batteries, by inserting extra resistance at *R* such as a radio rheostat, in the outside connection to the battery, to keep the charging current down to the low rate required by such batteries. These taps may be omitted if not desired. Connection *a* is positive for one, 3-cell, storage battery. Taps 1, 2, 3, 4, 5 are brought out through the side of the coil as shown in Fig. 4. These taps are 20 turns apart, beginning with the 320th turn, and, with the end lead, are connected to a dial switch, such as is used on radio sets, having a dead point between each of the live points to prevent short circuits. The center of this switch is connected to the line, and is used to control the charging rate as the line voltage varies. It should not be omitted.

Begin the secondary winding at *x* and put 70 turns on the first coil, ending at *y*. Here the end is brought out for connection to the line and to the filament coil *y z*. The latter consists of eight turns of double wire wound on in the same direction as the 70 turns. The terminals of the filament coil go directly to the porcelain receptacle that holds the bulb. From the tip of the bulb a flexible lead goes to the ammeter, then to the fuse, then to the negative battery terminal. Binding posts should be used on all terminals, correctly and plainly marked for voltage, kind of current and polarity.

Any small ammeter, such as those used on automobiles, may be employed. However, they are direct current meters and will register about half enough on the pulsating current of the charger. They may be altered by removing the coil that furnishes the magnetic field, and inserting another coil of double the number of turns, made from No. 18, enameled magnet wire.

Specifications for Two Ampere Charger

Core 1¼ inches square. Laminations 1¼x4 inches for sides of core; 1¼x2½ inches for ends. Primary coil, 420 turns, No. 18 wire, about 20 oz., taps at 320-340-360-380-400 turns. Secondary coil in two parts: first, 70 turns, No. 16 wire; second, 8 turns, No. 16 wire, doubled. Total, about 8 oz. Coils 2½ inches long. Mandrel, 1½ inches square. Use medium screw, porcelain receptacles for bulb and fuse. Fuse size, 3 amperes. Mount in box 5 by 6 by 8 inches high, inside. Both sides open.

Specifications for Six Ampere Charger

Core 1½ inches square. Laminations, 1½x5 inches for sides of core; 1½x3 inches for ends. Primary coil, 420 turns No. 16 wire, about 36 oz. Coils 3¼ inches long. Mandrel 1¾ inches square. Use mogul porcelain receptacle for bulb; medium screw receptacle for fuse. Use 10 ampere fuse. Mount in box 7x9x10 inches high, inside. Both sides open. Taps on primary coil at 320-340-360-380-400 turns, as shown on Plate B. The secondary coil is in two parts: first, 70 turns, No. 14 wire; second, 8 turns, No. 14 wire, doubled. Total, about 1 pound. The six ampere charger is more satisfactory than the 2 ampere size.

Design Calculations for the Small Transformer

If the proper dimensions for a transformer are not already known, the following procedure will give good results for sizes of 500 watts capacity and under. When larger sizes are wanted, they should be calculated according to methods and constants, as set forth in engineering handbooks and other publications specializing in transformer design.

The method of calculation here given is based on the following assumptions:

(1) Efficiency, 80 per cent.
(2) Power factor, 80 per cent.
(3) Frequency, (f) 60 cycles.
(4) Flux density, (B) 60,000 lines per square inch.

The following abbreviations are used:
E=primary volts (110 or 220).
e=secondary volts (always known).
I=primary amperes (Watts/E).
i=secondary amperes (Watts/e).
A=cross-sectional area of core in square inches.
T=number of turns of wire on primary winding.
t=number of turns of wire on secondary winding.
Then:

$$A=2.5\times I=\frac{2.5\times Watts}{E}=\text{area of core.}$$

$$T=\frac{6.25\times E}{A}=\text{primary turns.}\quad \left(T=\frac{E\times 100{,}000{,}000}{4.44\times A\times f\times B}\right)$$

$$t=\frac{T\times e}{E}=\text{secondary turns.}$$

The secondary turns should be increased by ten per cent to compensate for the voltage drop in the transformer.

To determine the wire sizes for the windings use 500 circular miles per ampere where ventilation is good and the transformer is loaded intermittently, and 750 circular mils per ampere for continuous duty and good ventilation. If ventilation is poor use 1000 circular mils per ampere.

For 25 cycle transformers let $A=3.5\times 1$, and $T=\frac{11.2\times E}{A}$. Wire sizes and number of turns in the secondary are determined in the same manner as for 60 cycle transformers.

For intermittent duty and good ventilation the cross-sectional area of the core in square inches may be reduced a fourth to a third below that given by formula.

Example. Calculate the design of a 60 cycle transformer of 100 watts capacity, 110 volts primary, and 10 volts secondary.

Solution:

$$I=\frac{Watts}{E}=\frac{100}{110}=.9 \text{ ampere, primary current.}$$

$$i=\frac{Watts}{e}=\frac{100}{10}=10 \text{ amperes, secondary current.}$$

$A=2.5\times I=2.5\times .9=2.25$ sq. in., area of core.

(Extracting the square root of 2.25 gives 1.5 inches for the width and thickness of core if it is to be square. Any other shape may be used.)

$$T=\frac{6.25\times E}{A}=\frac{6.25\times 110}{2.25}=305, \text{ turns in primary.}$$

$$t=\frac{T\times e}{E}=\frac{305\times 10}{110}=27.7, \text{ turns in secondary.}$$

TABLE III
Magnet Wire Data for Coil Calculations

B. & S. Gage No.	Area Cir. Mils	Approx. Number Turns per Inch in One Layer: Enamel	Cotton Enamel	Double Cotton	Ohms per 1000 ft. at 140 Deg. F.	Amps. Carrying Capacity at Current Densities of: 500 c.m. per amp.	750 c.m. per amp.	1000 c.m. per amp.
8	16500	7.5	7.2	7.0	.73	32.000	22.000	16.000
9	13100	8.5	8.0	5.0	.91	26.000	17.000	13.000
10	10400	9.5	9.0	8.5	1.16	20.000	14.000	10.000
11	8230	10.5	10.0	9.5	1.46	16.000	11.000	8.000
12	6530	11.5	11.0	10.5	1.83	13.000	8.700	6.500
13	5180	13.0	12.4	11.8	2.32	10.400	7.000	5.200
14	4110	15.0	13.5	13.0	2.92	8.200	5.400	4.100
15	3260	16.5	15.0	14.0	3.73	6.400	4.300	3.200
16	2580	18.5	17.0	16.0	4.64	5.200	3.400	2.600
17	2050	20.5	18.5	17.5	5.86	4.100	2.700	2.000
18	1624	23.0	20.5	19.0	7.40	3.200	2.100	1.600
19	1288	26.0	23.0	21.0	9.34	2.600	1.700	1.300
20	1022	29.0	25.0	23.0	11.77	2.000	1.300	1.000
21	810	32.5	27.5	25.0	14.85	1.600	1.100	.800
22	642	36.0	31.0	29.0	18.84	1.280	.850	.640
23	510	40.0	34.0	32.0	23.61	1.000	.750	.510
24	404	45.0	38.0	34.0	29.71	.800	.540	.400
25	320	50.0	42.0	37.0	37.55	.640	.430	.320
26	254	57.0	46.0	40.0	47.34	.500	.340	.250
27	202	64.0	50.0	44.0	59.70	.400	.270	.200
28	160	72.0	55.0	47.0	75.28	.320	.210	.160
29	127	80.0	60.0	50.0	94.92	.250	.170	.130
30	101	90.0	65.0	54.0	119.71	.200	.130	.100
31	79.7	100.0	70.0	57.0	150.91	.160	.110	.080
32	63.2	110.0	77.0	60.0	190.35	.120	.084	.060
33	50.1	127	83.0	64.0	250.00	.100	.066	.050
34	39.8	140.0	89.0	67.0	302.64	.080	.053	.040
35	31.5	158.0	95.0	70.0	381.64	.064	.042	.032
36	25.0	178.0	100.0	74.0	481.17	.050	.033	.025

Table III is used in calculating the length and thickness of coils, and the proper wire size to use, for the most common kinds of insulation. The first two columns carry the gauge number and area of the wire: the next three give the number of turns per linear inch in one layer: the sixth shows the resistance at a safe working temperature, and the last three give the carrying capacities at different current densities.

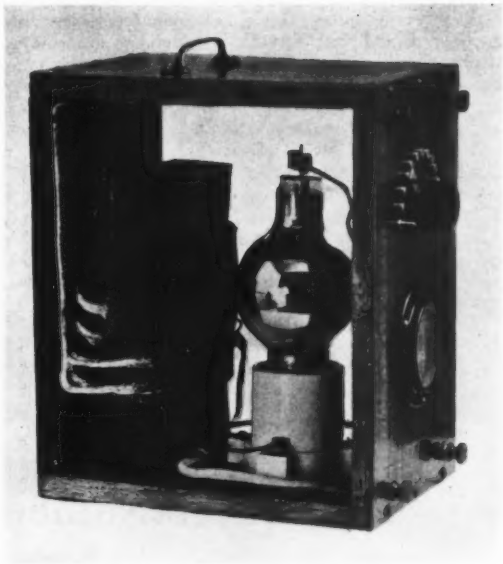


FIG. 8
Battery charger mounted in box with sides open for ventilation. Taps for radio "B" batteries omitted.

Adding ten per cent to the secondary turns gives 30 turns total for the secondary winding.

Wire Size

Assuming that the transformer is to be built for good ventilation and continuous duty, 750 circular mils per ampere will be allowed for both primary and secondary wire sizes. Consulting Table III, column 8, it will be seen that No. 22 wire will not quite carry the primary current of .9 amp., so No. 21 wire will be chosen. Likewise the secondary winding, with a current of ten amperes will require No. 11 wire. It is safest to choose the next size larger when the required size falls in between sizes.

With good ventilation and intermittent duty, 500 circular mils per ampere would suffice, permitting, in this transformer, wire two sizes smaller to be selected for each winding, while, if the transformer were inclosed, and ventilation restricted, the wire size should be chosen from the column marked "1000 c.m. per amp.", which would call for larger wire in both windings. Also, if the transformer were to be used only a few minutes at a time, with long periods of rest between, the cross-sectional area of the core could be reduced from 2.25 sq. in. to 1.7 sq. in. or perhaps to 1.5 sq. in. area. This would cheapen the whole transformer considerably.

TABLE IV
Weight of Magnet Wire

B. & S. Gage No.	Pounds per 1000 Ft.: Enamel	Cotton Enamel	Double Cotton	B. & S. Gage No.	Pounds per 1000 Ft.: Enamel	Cotton Enamel	Double Cotton
7	63.69	61.80	61.70	22	1.97	2.12	2.16
8	50.55	51.25	51.15	23	1.56	1.67	1.72
9	40.15	40.70	40.60	24	1.24	1.33	1.40
10	31.80	32.26	32.18	25	.988	1.07	1.13
11	25.25	25.66	25.60	26	.785	.857	.941
12	20.05	20.48	20.40	27	.622	.684	.756
13	15.90	16.32	16.20	28	.494	.548	.607
14	12.60	12.90	12.91	29	.391	.437	.489
15	10.00	10.27	10.33	30	.310	.355	.395
16	7.93	8.18	8.21	31	.248	.287	.325
17	6.27	6.48	6.54	32	.196	.235	.270
18	4.98	5.16	5.23	33	.155	.190	.227
19	3.95	4.12	4.22	34	.123	.155	.193
20	3.13	3.27	3.37	35	.098	.128	.160
21	2.49	2.62	2.68	36	.077	.106	.136

Coil Size

Select two inches for a reasonable coil length. It is seen, by consulting Table III, column 4, that there are 27 turns per inch in one layer for No. 21, cotton-enameled wire. A 2-inch layer will then hold $27 \times 2 = 54$ turns. The whole number of layers will be $305/54 = 6$ layers, nearly, which will make a coil about one-fourth inch in thickness. Since this is quite thin, the secondary may well be wound on top of the primary, with a layer of insulating paper between. Again, from Table III, we find that No. 11 wire for the secondary runs ten turns per inch, or twenty turns per layer, making nearly two layers, and adding about one-fourth inch more to the coil thickness. Then, after taping, the total thickness of the coil will be approximately five-eighths inch.

The length and thickness of the coil determine the size of the winding space or "window" of the core. There is no accurate rule for selecting the coil length. Roughly it may be taken as two per cent to three per cent of the transformer's output in watts. The winding space, dimensions (C) and (D) of Fig. 2, should be $\frac{1}{8}$ inch to $\frac{1}{4}$ inch larger than the coils to prevent crowding.

Core Size

With a coil size of $2 \times \frac{5}{8}$ inches, the winding space in the core may be made $2\frac{1}{4} \times \frac{7}{8}$ inches, which is one-fourth inch larger each way. These are the dimensions of the inside opening, or "window." The outside dimensions will be found by adding to the above twice the width of the core laminations. Since the core is to be 1.5 inches square, the outside length will be $2\frac{1}{4}$ plus (2x1.5), or $5\frac{1}{4}$ inches, and the width will be $\frac{7}{8}$ plus (2x1.5), or $3\frac{7}{8}$ inches. The side laminations for the core will be $5\frac{1}{4}$ minus 1.5, or $3\frac{3}{4}$ inches long, and the end laminations will be $3\frac{7}{8}$ minus 1.5, or $2\frac{3}{8}$ inches long.

Mandrel Size

The wood mandrel, upon which the coil is to be wound, should be at least one-fourth inch larger each way than the iron core. In this case it would be $1\frac{3}{4}$ inches square. If it is a little larger than that, and the coil is loose on the core, narrow wedges may be inserted on all four sides between core and coil. This will leave a ventilating duct all around the core and the transformer will operate much cooler.

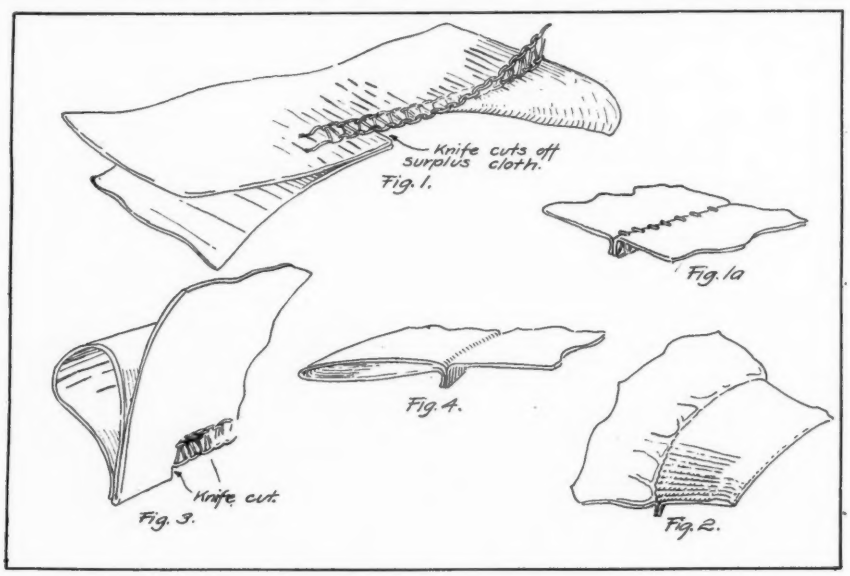
The Establishment of a Class in Textiles

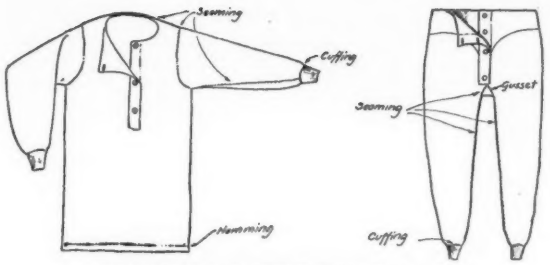
H. H. Todd, Amsterdam, New York.

Amsterdam is a city devoted largely to the manufacture of carpets, underwear, and silk goods. Other industries are represented in its industrial life, but the bulk of its labor is employed in some branch of the textile industry. The mills are large and the work is highly specialized. Much juvenile labor is employed, and most of the work though requiring manual labor and dexterity, does not call for any particular academic training, even the use of the English language being unnecessary in many positions.

Probably 90 per cent of the jobs in a textile mill may be learned in a week or two, although speed is naturally acquired with practice. Many of the jobs, in fact, require only a few hours as a learning period. Surveys made in other sections covering the textile industry have developed little that may be used as a basis for trade training. However, any city having from two to three thousand power-machine operators, as in Amsterdam, has a problem of overhead expense in its factories. This expense entailed through the two or three weeks' training required for fitting an operator to earn money for herself and employer, is such that it extends a challenge especially to the continuation school. An employer trains his employees only because of necessity. He is primarily in business to produce goods and to make a profit. Every new hand to be instructed on a job, no matter how simple, adds appreciably to the factory overhead. Production is slackened; the attention of the foreman is distracted from his regular duties; the service of a teacher may be required; or an experienced worker may be selected to teach, thus stopping her own production. To the overhead expense incurred in this way must be added other expense in the way of machine breakage and spoiled materials. When a new hand enters as a link in the chain of operators, passing work from one to another, the speed of the whole room becomes adapted to that of the slower worker.

Since visits to one room or another are not permitted in a large mill, the employees are not able to learn about the source of the material coming into their hands, or the several operations through which it has passed previous to their receiving it. Neither do they obtain an idea of the processes following their jobs, in the turning out of the finished product. Possibly, if a boy or girl were to remain on the job with no chance for promotion—either through





TYPICAL KNIT GARMENTS MADE IN THE AMSTERDAM SCHOOL.

lack of initiative on the part of the employee, or of necessity on the part of the employer—any very wide view of the whole industry would not be necessary. But in time the factory recognizes the need for new foremen, new room superintendents, and other minor officials to replace those who have dropped out. Obviously, these positions cannot be filled with employees who have a knowledge of only one operation. Again, it becomes necessary many times to transfer employees from one operation to another. In this case, it is again necessary that the operator have a general knowledge of the whole process of manufacture as an aid in taking up the new work.

Another source of expense to the employer in a textile mill is the socalled "floater." In a town where several firms carry on the same type of industry, this parasite flourishes. Some mills have an employment manager who does his best to eliminate incompetents; in other mills, each section superintendent hires his own help. In many cases, unless some form of trade test is used, it becomes difficult to tell whether a girl will become a good machine operator, underwear inspector, or button sorter. Perhaps it would pay employers generally to do more testing and adapting of operators in place of so much hiring and firing. The "floater" in the absence of trade tests, takes advantage of the situation. She secures a place as a learner in one of the mills. Although hopelessly unable to learn the operation of a power machine, she usually manages to stay three or four weeks on the job, drawing good pay, before the foreman discovers that the girl is unsuited to the work. Since there are many places where power-machine operators are employed, and each department is in charge of a different foreman, a girl operator can drift from one place to another almost indefinitely, with the result that she makes good wages and yet is a non-productive worker.

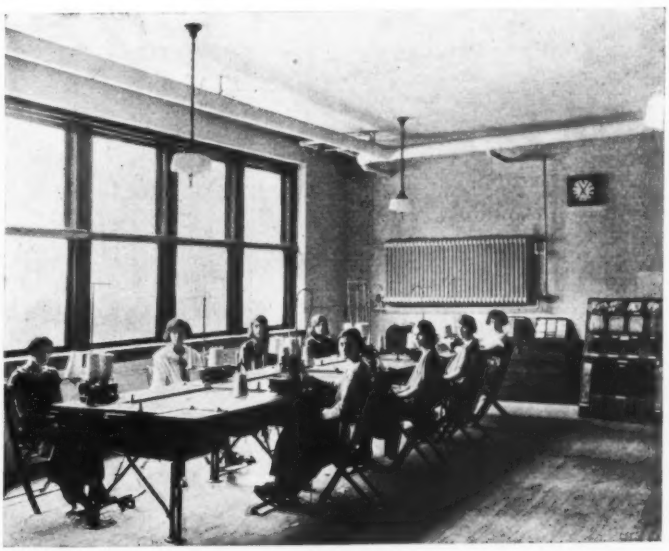
From the point of view of the employer, any device that will avoid a part of the overhead expense should be welcomed. The employee, present or future, also has a lively interest in the whole matter of opportunity and training. Self-interest urges him to make as early a decision as possible as to his own capabilities. Days lost now in searching for the proper labor niche can never be regained. Human inertia and fear of the unknown prevent a change of jobs even where the individual realizes that he is in the wrong place; especially is this true if the chance to change comes late in life after habits are settled. Every advantage lies with the individual who can make an early decision as to the work for which he is best fitted. In meeting local needs, the employer and employee are, therefore, equally interested in seeing that the schools offer as wide a variety of try-out and trade courses as possible. The school authorities in Amsterdam were of the opinion that a course in power-machine operation in the continuation school would serve the needs of the pupil and the employer alike. The pupils of 14 to 16 years begin a try-out period in the class. If they find the work congenial and possess an aptitude for it, they remain long enough to become familiar with the processes involved. The pupils who display none of the qualities necessary for becoming good operators are advised to apply for positions in other lines of work, and are eventually placed in either home-making or commercial classes for further training. This obviates attempts to train pupils unfitted for power-machine work and it reduces the chance of the employee entering a wrong type of work.

Since power-machines in a continuation school are run at a slower speed than in a mill, the girl pupil has less fear of them; breakage of machines is not so frequent; spoilage of material is reduced, and the teacher has a better opportunity to observe and to correct wrong methods of working.

Through exhibits, charts, drawings, and shop talks, a general knowledge of the whole manufacturing process from raw material to finished product ready for shipment, is offered to pupils. At the same time, the girls may be changed from one job to another so that a general knowledge of several different jobs is obtained in the school shop. In a small way, this method aids in the facility with which a girl operator is able to change from one operation to another in the textile mill.

Letters are regularly sent to the foremen in each mill where help is wanted, asking them to make use of the school employment bureau in two ways that serve as a check on the "floater." First, the foreman is asked to use as many girls as possible from those recommended by the training department of the school. Second, he is cautioned not to employ girls who in applying for work, state that they have been trained in the classes of the school, without first obtaining from the training department an opinion as to their ability for the work. The second request is made for the reason that a pupil may have been enrolled for only a day or two in the power-machine class, and may claim to have had instruction. The school must be protected from adverse criticism which attaches to it when a pupil fails to measure up to the position in the mill. The caution serves to protect the employer from incompetents and it prevents the pupil from accepting an unsuitable position.

The classes are taught by experts who have had years of experience as operators, as instructors of beginners in a factory, or as workers on samples. The machines are the usual mill type and are installed in the same manner as those in the mill. The only difference



TEXTILE CLASS IN THE CONTINUATION SCHOOL AT AMSTERDAM, N. Y.

to be noted is the absence of high speed in the operation of the machines. This is obviously necessary in a school where beginners are taught.

In beginning the classes, every factor having a tendency to help or hinder the success of the work was discussed with the mill-owners and the men on the job. It was felt that the pupils should be put on a production basis as far as possible. There was a fear on the part of the employers that work on underwear material might turn out to their disadvantage. They feared the expense from possible spoilage of goods and the seconds that might become their main product. However, one mill-owner who gave the school several dozen drawers as a trial order, found that the work was on a par with the regular mill product. There was almost no spoiled goods and actually fewer seconds than were produced in the regular mill run.

To offer a greater variety and to increase the interest in the work, the girls were allowed to make underwear for themselves. A good grade of woven goods was purchased, patterns were cut out, and the entire garment made in the school shop. The work was not done according to mill methods in several operations because of the absence of a machine for making buttonholes or for sewing buttons. These operations are all performed by hand.

In connection with the work, the following operations are taught: Seaming, crocheting, cuffing, hemming, turning, and inspecting. Seaming is the operation of joining together the various parts of the garment. Methods of seaming have changed greatly in the underwear industry. At one time seams were stitched, then cover seamed. Finally a machine was installed which seamed and cover-seamed in one operation. (Fig. 2). More recently, there has come into use the socalled flat-lock machine, which makes a seam with no overlapping. A seam made in this manner is no thicker than the cloth from which the underwear is made. The machine, however, is too complicated for school use.

In Figure 1 are shown the stitches for seaming and covering the edges of the material. The raw edges are held and protected by threads looped over them. A crocheted edge is made with the same machine with only one thickness of material. As a finish on some kinds of underwear a crocheted edge is used in place of the ribbed cuffs on sleeves and bottoms of legs. Cuffing is merely another form of seaming. The sleeve is fulled on to the ribbed cuff previous to seaming. This is shown in Figure 2.

Hemming is another operation which may be performed on the seaming machine, with the usual stitch shown in Figure 1. It may also be performed on a special machine, using a different stitch and a different method. If an ordinary seaming machine is used, the hemming is done as shown in Figure 3. In Figure 4 the hemmed edges are shown, flat finished. This edge is also used for finishing the bottoms of shirts in two-piece underwear suits.

Trimming is the operation of cutting the loose ends of threads left on the ends of the seams. The finished garment is turned and inspected for flaws. Girls working on the last three operations in a mill are given a machine after reaching the legal age for this kind of work.

Clothes Hamper

Frank W. Dejmek, Algoma, Wis.

Weaving is fascinating, easy to learn, and a profitable past time, requiring only a small number of inexpensive tools. Fibre-cord is the material most commonly used for weaving furniture. It is made of tough, twisted sulphite paper which is made from a wood pulp. It is clean, easy to work with, and, when properly covered with finishing materials, will give excellent service.

Where does the family laundry go? Down into the basement, into an old basket? Or in a corner in the closet? Why not put it into a hamper? A hamper is easily made, at a reasonable cost considering its usefulness.

Figure 5 shows five hampers, made in the author's class. These hampers take care of the laundry in the homes of the owners and provide the members of these families a definite place to deposit their laundry.

The following suggestions may be of some value to students wishing to make a hamper as shown in the drawing.

White pine is about the best wood to use for the frame. It is easily worked, light in weight, and has enough life to keep the frame rigid.

Cut out the stock required for the posts, surface it and cut off for length. Should the hamper be made wider than the one shown in the drawing or the front of the hamper curved, add a fifth post to the front of the hamper as shown in Fig. I. The outside corner of each post should be slightly rounded.

Then cut out the stock required for the three frames, namely, bottom, top, and cover. The slip joint or sometimes called the open mortise and tenon joint is an ideal

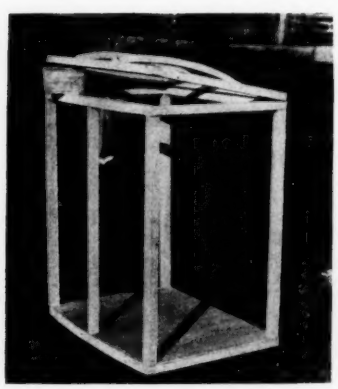


FIGURE 1.

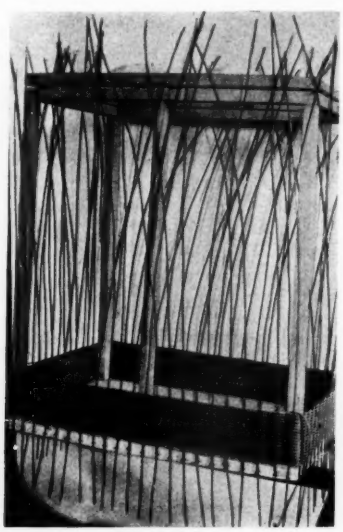


FIGURE 2.

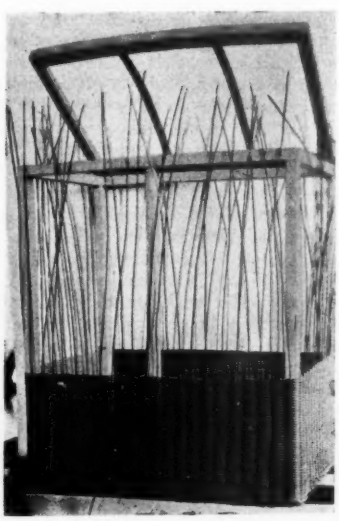


FIGURE 3.

joint for this purpose. The fact that all pieces are of the same width and thickness makes it easy to saw out this joint with the circular saw. Cut the mortises on the long pieces and the tenons on the short ones. The frame for the cover may then be glued and bradded. Glue the top and bottom frames, but do not drive brads into these because the screws put through these frames, when fastened to the posts, are sufficient to hold them rigid.

Next cut the veneer to the size of the bottom frame, glue, and brad it to the top side of the frame. Apply a coat of thin paint or oil to the edge of the veneer to prevent the glue sizing from affecting the veneer.

Bore holes for the screws and fasten the top and bottom frames to the posts. This completes the main part of the hamper frame.

The height of the curved pieces attached to the top may vary. However, the dimensions given in the drawing give the finished cover a well-rounded appearance. The hinges should not be set into the frame. This gives a little clearance which prevents the brad on the back from rubbing on the whaling.

Fasten a set of "domes of silence" on the bottom, and give the entire hamper frame a thin coat of paint.

When thoroughly dry, mark off one and one-eighth inch spaces around the bottom frame, starting seven-eights inch from the corner on the front side and eleven-sixteenth inch from the corners on the sides. There will be eighteen stakes on the front side and thirteen on each side, making a total of forty-four stakes for the three sides. On the back crowd in an extra stake making nineteen instead of eighteen stakes in order to secure an odd number of stakes. Cut sixty-three, three thirty-seconds inch stakes, thirty-two inches long. Stakes come in eight foot lengths so three stakes can be cut from each eight foot piece. This allows three inches above and three inches below the frame for finishing. Fasten the stakes on the frame with five-eighths inch—No. 15 spring staples, as shown in Fig. 2.

Then begin weaving with two thirty-seconds inch fibre-cord by tacking the weaver to the back side of the frame, weaving in and out, to the right around the frame as shown. After covering about four or five inches fasten the part woven to the posts by driving a five-eighths inch No. 20 flat-head wire nail through a weaver on each post. This prevents the woven part from sliding up or down when the staples are removed to complete the bottom border. Start a new weaver where the first one was started and weave to the left around the frame about three times; add a weaver and double weave around once, using the left-hand weaver at the rear and the right-hand weaver forward; then reverse the weavers and double weave around the frame once. This gives the effect as shown in Fig. 3. Next put on the three rod coil and turn in the stakes, making the coil appear as a four rod coil. This can easily be seen in Fig. 3. With the bottom finished, the hamper is easier to handle. Continue weaving up the sides and finish off the top the same as the bottom.

Remove the cover, mark off spaces for eighteen stakes as on the front side of the hamper. Cut off the required number of stakes, allowing about one inch extra. Fasten the stakes to the front of the frame as shown and begin weaving back and forth, nailing

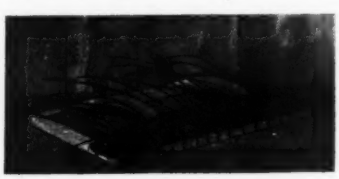


FIGURE 4.

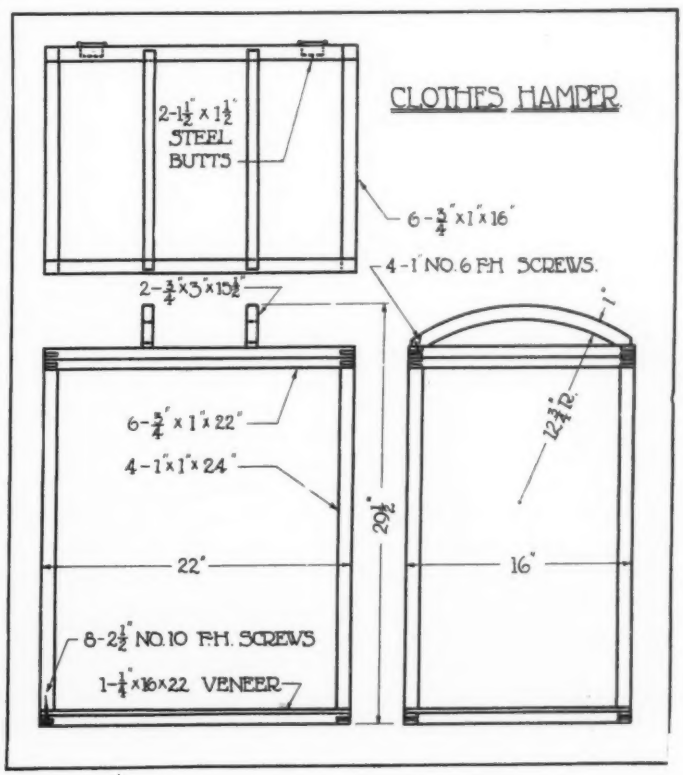
FIGURE 5.

the weaver on the sides as shown in Fig. 4. Nail the stakes to the back of the frame and cut off. Then cut four weavers twenty feet long and four ten feet long. Double the long weavers in the middle and place the ends of the three short weavers through the loop formed and begin braiding. The common braid, as shown in Fig. 5, is a simple and yet an attractive braid. Fasten this braid on the cover with nails about three inches apart. End the weavers under the loops, nailing the ends to the frame to prevent unraveling. If the weavers are carefully matched, the finish will not be noticeable.

Attach a short, narrow braid on the front of the cover to serve as a handle, as shown in Fig. 5. Then fit the furniture handles on the sides as shown. Remove these before applying the finish.

The hamper is then ready for the glue-sizing and finishing materials. Select a color or colors which will harmonize with the color scheme of the room in which the hamper is to be used.

The weaving of a hamper requires a good deal of time, so after the students had a good start in weaving, they were given the privilege of taking the hampers home to weave during their spare time. This gave the boys a chance to work at another project in the shop during class time.



BRUCE-MILWAUKEE

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

THE NEW TEACHER'S FIRST PROBLEMS

The beginning teacher of the industrial arts faces a number of difficult problems at the very first meeting of his classes. His first test is to get himself before his pupils in an easy, natural manner that will command their respect and confidence. The personal side of a teacher's relation to students is a most important one. It is perfectly vital, therefore, that the teacher should not give his pupils the wrong impression of himself at the start.

There will always be a feeling of strangeness pervading the first meeting of teacher and pupils. This must be overcome by the personal contacts and conversations with individuals before the pupils assemble as a class. Here is an important matter: The teacher should be the *first arrival* at the shop or place of work. This is a good rule to follow all through one's teaching experience. Meeting the individual boy as he comes to the shop, the teacher has every opportunity to start a friendship that will be a valuable asset when the work gets under way. In this first meeting, it is well to remember that the most interesting things in the world to a boy are himself and his own personal affairs. These, therefore, constitute the materials for the first conversation and furnish the basis for character estimate and lasting friendships.

When the class is assembled, the preliminaries should be disposed of as briefly as possible. There are, of course, certain matters of routine to be attended to at the beginning, but any discreet teacher will see the wisdom of making such preliminaries and routine very brief. *The boys want to get to work,* and the beginning is a good time to start the habit.

The temptation is very great at the outset to lecture the class to mental and physical exhaustion. Many a teacher has "queered" himself with his pupils by talking the life out of them during the very first recitation. It is much better to get the class into some active participation in the work at the earliest practicable moment.

Finally, one of the commonest errors and one of the most tempting blunders into which many teachers fall, to his own injury, is criticism of the predecessor's methods and work. Unfortunately, pupils delight often in telling the new teacher the shortcomings of his predecessor. Unfortunately also, samples of the previous year's work and unfinished articles left in the shop are neither a safe nor a fair basis for judgment of the other fellow's ability and success. Discretion and generosity with reference to one's predecessor are not only the mark of a gentleman, but they are the sure and safe pathway to the respect and confidence of the pupils and the community.

The beginning teacher, therefore, faces a very grave crisis at his first meeting of his pupils. It is a crisis, however, which good common sense and a fair, square, man-to-man attitude will successfully meet and turn to advantage.

HIGHER EDUCATION

Another season of summer schools has passed and, while exact records are not available, there is evidence that the attendance at summer schools by teachers of the public schools seeking to advance in scholarship, shows the average increase of the last several years.

The incentive for this increased attendance in summer schools is largely one of meeting the requirements put upon teachers for appointment. No profession will rise much above required standards.

Individuals will follow a line of study from pure delight in the subject, but a professional class will not study the variety of subjects required for advancement unless it is made necessary.

Teachers of the Industrial Arts are specialists in the teaching profession. They need special study of the particular subjects and are anxious to secure training in their specialty. The opportunity for such training is inadequate but increasing.

Teachers of the Industrial Arts have the peculiar obligation of upholding the Industrial Arts to educational standards. Many school authorities are suspicious of the Industrial Arts as not of educational importance or standard; much of the work offered is not of great educational value.

This suspicion can only be overcome by thorough training in educational purpose and procedure on the part of the teachers of the Industrial Arts. They must become experts in education as well as experts in the arts and industries. Their business is education. Industrial Arts is but the instrument in which they are expert educators.

THIS SUMMER

A summer class in the arts is the most forlorn of educational cure-alls.

Forty teachers with forty convictions born of experience. Forty times forty subjects to teach within the one comprehensive subject of Art, to forty teachers of forty convictions in forty hours.

We did a little of this and a little of that. We did little that could be called artistic because our conceptions kept well ahead of our limited skill and time. It does take time to execute a work of Art. Ghiberti spent his life on the bronze doors "fit to be the gates of

Paradise." We spent one hour on designs which will not and perhaps could not be executed in a life time.

We illustrated the habitations, costumes and customs of mankind from Adam to Czecho-Slovakia. We drew, painted, modeled, cut, tore, wove, cast, stenciled, block-painted, batiked, and gessoed.

We finished the summer session with renewed suspicion that "Art is long and time is fleeting," but with the conviction that life is not worth spending on anything else but Art and the resolution to keep everlastingly at it.

TECHNICAL OR CULTURAL

Though no one seems able to show just what part of our school instruction is cultural and just what part of it is technical, there is no lack of expressed opinion as to the comparative value of these two kinds of school training. School instruction is gradually changing from the exclusive use of text and the lecture to practice as a demonstration of conception.

The school as a laboratory of the interests and activities of life is the ideal held in the mind of the modern educator. The child goes to school to live and learn to live under the guidance of teachers who have become expert in the desirable interests and activities of life. He learns by thoughtful doing. The doing involves technical difficulties in which he must be trained in order to express himself. All school training is, therefore, primarily cultural but of necessity in part technical as a means to the end that each child must express himself. This is quite as true of the graphical and Industrial Arts as it is of the arts expressed by language.

The Industrial Arts have come to the school through the conception of doing as important in the educational process. The technical accomplishment has been exaggerated in much of this instruction. We are given to teaching how to execute this or that project, and often fail to use the project as the instrument of education. There is much of important content belonging to the Industrial Arts which is technically impossible of execution in school. Good illustrations of the graphical and applied arts must be used to impress this content. No child can execute but a little of the aesthetic and structural conceptions which he should realize and appreciate.

Let us no longer attempt to justify the Industrial Arts by the meager technical accomplishment possible in the school, shop, or studio. Let us no longer be satisfied with the making of a few drawings and objects as the total results of a course of study.

THE COMMERCIAL MAN IN THE FIELD OF INDUSTRIAL EDUCATION

Nowhere has the traveling salesman or the field representative of commercial houses been more welcome and more helpful than in the field of industrial education. Representatives of commercial firms dealing with equipment, supplies, and books for this special field, are as well known and as active in the various teachers' organizations as are the leading educators in this particular phase of education.

If we admit that at first these representatives were welcomed because of their financial aid, it is gratifying to note that now they are not only welcomed to the conventions, but they are in demand for places on the programs and they are helpful participants in the various discussions on the floor of the meetings.

Not only this, but various manufacturers are seeking the services of leading educators, not in order unduly to influence the judgment of teachers, but to be able to give expert advice to teachers in service. Great commercial concerns have found out that business *follows service.* The expert, therefore, who understands both the educational and the commercial aspects of the problems, equipments, and supplies of industrial education, does not have to think constantly of *making sales.* He knows that if his concern and his concern's products and force can render real service, the sales will inevitably follow.

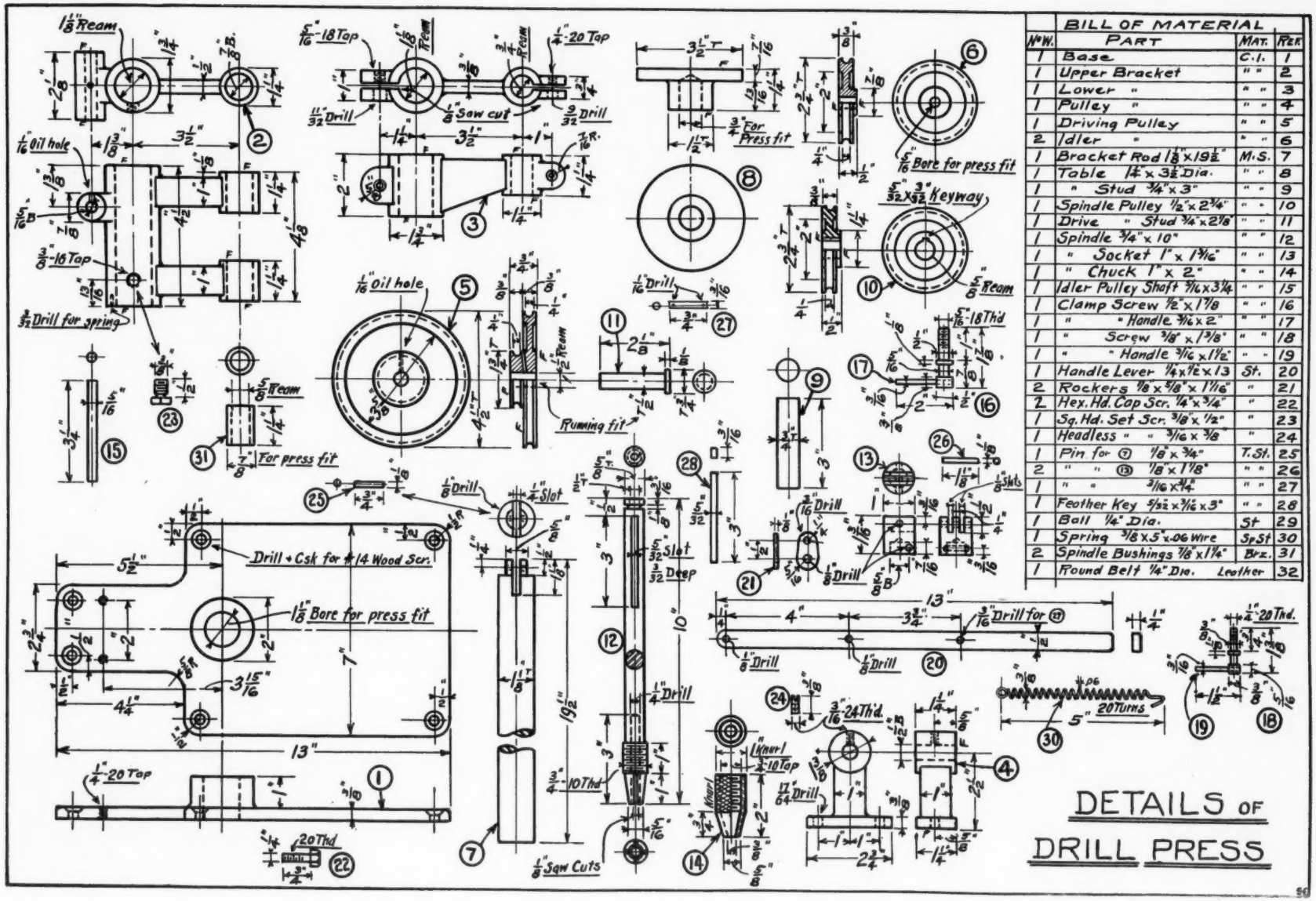
Year after year for a generation, the commercial men and women have brought beautiful and expensive exhibits of their wares to the various educational conventions. These exhibits have probably exerted as great an educational influence on the membership of the conventions as the educational addresses delivered by the speakers on the programs. Outstanding men and women have been in charge of such exhibitions for their companies, and they have met the membership of the conventions on a professional basis. They have not *sought to sell;* they have been generously active always in the promotion of the best interests of the conventions and their members. They have been skilled in their demonstrations and painstaking in their service, and they are to be credited with a very large share of the progress which industrial education has made in this country.

In the field of industrial education, as in almost every field of modern advancement, the "Knight of the Grip" has been foremost among those who contributed in largest measure to the success and progress of the work in hand.

THE PROBLEM IN VOCATIONAL EDUCATION

The great problem in vocational education now and for the immediate future is the training of those who have already gone to work. Nothing can be more "neglectful of the finer things of life" than the heartless way in which society has acquiesced in the wholesale termination of school advantages and the absorption of millions of immature youth in competitive business and industry without adequate preparation or sympathetic supervision.—William T. Bawden, United States Bureau of Education.

Art that is not purposeful, that is to say, not related to the community in which it occurs, is useless. Hence the artist who believes that what he individually thinks, feels and does is of greater importance than the reaction of the community to his performance, is a purposeless artist and must eventually produce purposeless art.—Albert Sterner.



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2	Idler "	" "	6
1	Bracket Rod 1/8" x 19½"	M.S.	7
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1	" Stud ¾" x 3"	" "	9
1	Spindle Pulley ½" x 2¾"	" "	10
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1	Spindle ¾" x 10"	" "	12
1	" Socket 1" x 1 3/16"	" "	13
1	" Chuck 1" x 2"	" "	14
1	Idler Pulley Shaft 7/16 x 3¼	" "	15
1	Clamp Screw ½" x 1⅛	" "	16
1	" " Handle 3/16 x 2"	" "	17
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1	Handle Lever ¼ x ½ x 13	St.	20
2	Rockers ⅛ x ⅝" x 1 1/16"	"	21
2	Hex. Hd. Cap Scr. ¼" x ¾"	"	22
1	Sq. Hd. Set Scr. ⅜" x ½"	"	23
1	Headless " " 3/16 x ⅜"	"	24
1	Pin for ⑦ ⅛" x ¾"	T. St.	25
2	" " ⑬ ⅛" x 1⅛"	" "	26
1	" " 3/16 x ¼"	" "	27
1	Feather Key 5/32 x 3/16 x 3"	" "	28
1	Ball ¼" Dia.	St	29
1	Spring ⅜" x .5" x .06 Wire	Sp St	30
2	Spindle Bushings ⅛" x 1¼"	Brz.	31
1	Round Belt ¼" Dia.	Leather	32

DETAILS OF DRILL PRESS

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taboreta, towel holders, etc., which have been made from time immemorial, ad nauseum.

A SMALL DRILL PRESS

Henry L. Buehren, Cincinnati, O.

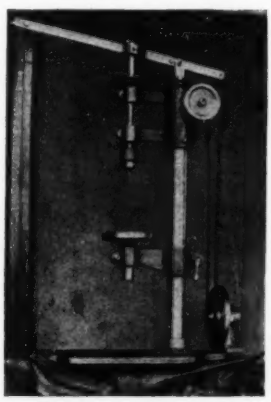
This is a good problem for boys above the average in gray matter and hand technique. It is especially adapted to boys who have completed two years of work in machine shop and mechanical drawing and who are commencing their third year, (9th grade), in the above subjects.

The problem presented itself two years ago and was worked out between the students, Mr. Wollenhaupt in the machine shop, and the writer in the mechanical drawing classes, at the Bloom Junior High School in Cincinnati. After many rough sketches had been prepared and corrected, complete detail and assembly drawings were made. Patterns were made; the parts were cast, machined and assembled, and practically all the boys took part in the work.

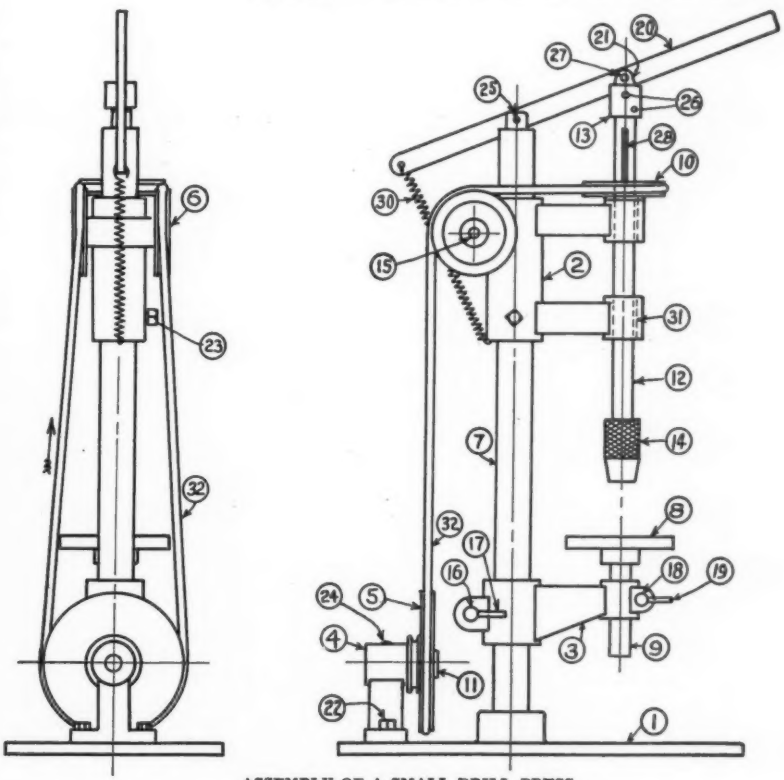
Since the first drill press was made, it has furnished an excellent problem to many boys, with slight variations here and there. It is a real product and will drill a hole up to a quarter inch. A small motor, like those used by model builders, furnishes the necessary power. We are now trying to revise the design permitting the use of a direct connected, built-in motor, to be made for us in our electrical shop.

In drawing, the problem furnishes an opportunity of giving out jobs very much as it is done in the commercial drafting room, and all according to the ability of the individual. Some boys will detail smaller parts; some will detail all parts; a few will do both detailing and assembling, and the training provides excellent opportunity for any or all.

In the machine shop the making of the drill furnishes work requiring the use of the milling machine, lathe, drill press, grinder, and considerable bench and vise work. The cast iron base, brackets, etc., require careful layout work for centering the holes to be drilled, reamed, or tapped. Chasing of threads, turning of micrometer dimensions, filing and grinding, and the various other methods of putting "finish" to metal, careful and accurate use of the hack saw—and in fact, a thorough acquaintance with the entire machine shop—are involved in completing this useful little machine.



THE DRILL PRESS MADE BY THE AUTHOR'S CLASS.



ASSEMBLY OF A SMALL DRILL PRESS.

ICE CHEST

Arthur M. Petsch, Kearney, Neb.

In answer to the inquiry in the May issue of the Industrial Arts Magazine for a suitable plan of a small refrigerator, I am submitting the following plan and description.

This project is a fine combination of woodwork and sheet metal work. The ice chest can be made by any boy of ordinary intelligence, and it proves to be an excellent shop project. Keen interest is shown by the boys due to the fact that they want to construct an ice chest which will excel the commercial product in performance.

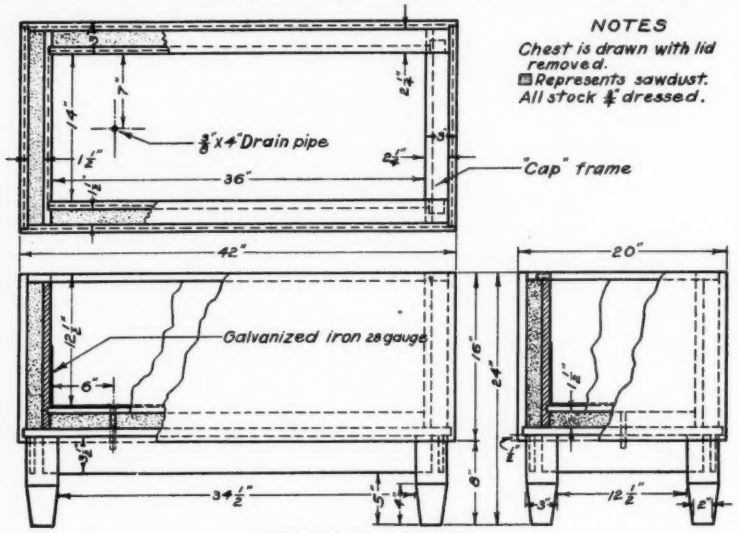
The accompanying drawings illustrate an ice chest which has been used very successfully in several homes. The inside measurements may be varied from the dimension shown in the drawings to suit the individual's needs. The chest shown in the drawings will easily accommodate a family of five and for ordinary use will use on an average between 50 and 75 pounds of ice per week. The ice will last much longer if newspaper is wrapped around it.

Cypress and white pine has been used in the author's classes and found very satisfactory for use in the construction of this ice chest. These woods withstand the effects of the cold and warm temperatures to which they are exposed. However, should one desire a more elaborate chest, oak may be used for the base, outer box, top and frame of the lid, and pine or cypress for the inner box and bottoms.

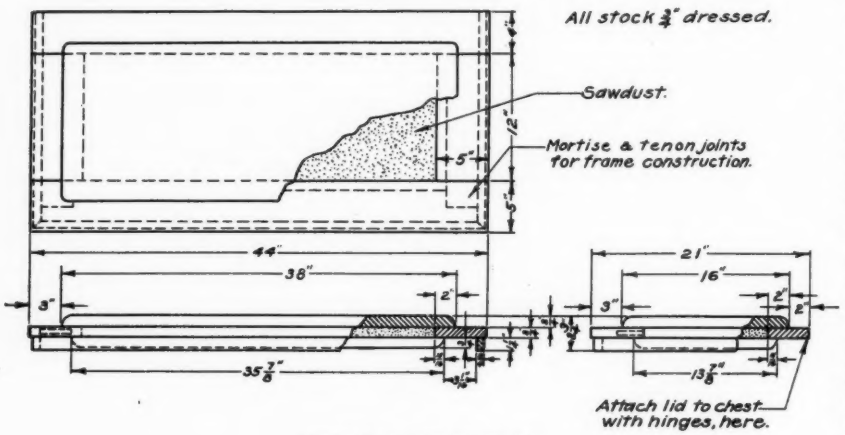
The construction of the ice chest is very simple. Study the plan carefully before proceeding to construct the chest. The outer box should be made first with one end fastened temporarily. The outer box should be fastened together

with finishing nails. The nails should be set and the holes filled with putty. The putty should not be placed in the holes until stain is applied.

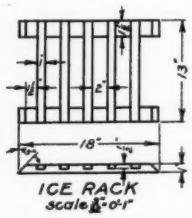
The inner box should be made next and placed in position. This box is fastened together with screws No. 10—1½" f.h. The inner and outer boxes are fastened together with screws No. 10—1½" f.h. on the bottom and back and with finishing nails in front. The two boxes are fastened together at the top by means of the "cap" frame that seals the end and side openings filled with saw dust between the inner and outer boxes. The "cap" frame is fastened with finishing nails to the two boxes. The reason for fastening one end of the outer box temporarily is, so that it may be easily removed and the sawdust may be packed between the bottoms of the two boxes. After this is done the end of the box may be fastened permanently in place. The side and end spaces are now packed with fine sawdust after which the "cap" frame is fastened in place. At this stage of the assembly it will be wise to attach the base to the chest. This is done easily by turning the chest bottom side up. A very pleasing effect may be secured by constructing the base so that it will come flush with the chest at the sides and ends. Accent the joint by rounding the bottom edges of the chest and the top edges of the base rails and legs.

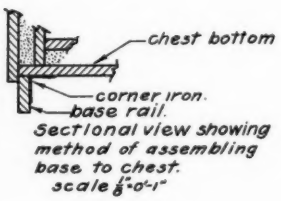


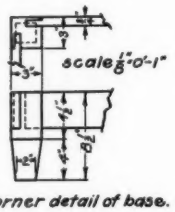
DETAILS OF ICE CHEST.

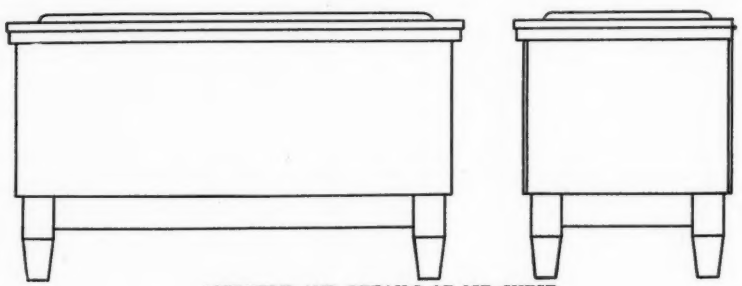


DETAILS OF ICE CHEST LID.









ASSEMBLY AND DETAILS OF ICE CHEST.

NOTES

Chest is drawn with lid removed.

▨ Represents sawdust.

All stock ¾" dressed.

The chest and base are fastened together by the same method as shown in the detail on plate 3. The galvanized iron may now be cut and placed in the chest. It will be necessary to solder the iron where it folds in each corner. The drain pipe should be placed in position. The hole should be cut in the galvanized iron so that the edges may be folded down into the pipe and soldered. The next step is to fasten the lid to the chest. The hinges may be mortised in on the bottom side of the top frame and on the top side of the "cap" frame or placed on the back, on the outside. The former method is recommended if skilfully done. It is not necessary to attach a chain to the lid to prevent it from falling back too far, when open, unless desired by the boy making the chest.

Any desired finish may be used. This depends wholly upon the taste of the individual and somewhat upon the place where the ice chest will be placed. The kind of wood used will determine to some degree the finish. A dull finish is very satisfactory and only the exposed parts of the chest should be finished. Do not stain, shellac, wax, or paint any portion of the ice chest on the inside including the "cap" frame and ice rack.

Stock Bill

No.	Name	T	W	L
	Lid			
2	Frame ends	¾"	5"	17"
1	Frame front side	¾"	5"	44"
1	Frame back side	¾"	4"	44"
1	Top panel	¾"	16"	38"
1	Bottom panel	¾"	13⅞"	35⅞"
2	End rails	¾"	1¼"	20¾"
1	Front rail	¾"	1¼"	43½"
	Outer Box			
2	Ends	¾"	16"	19¼"
2	Sides	¾"	16"	42"
1	Bottom	¾"	19¼"	41¼"
	Inner Box			
2	Ends	¾"	15¼"	18½"
2	Sides	¾"	15¼"	36¾"
1	Bottom	¾"	14¾"	36¾"
2	End caps	¾"	2¼"	16½"
2	Side caps	¾"	2¼"	40½"
	Base			
2	End rails	¾"	3½"	15½"
2	Side rails	¾"	3½"	37½"
4	Legs (to be shaped as designed)	3"	3"	8½"
	Ice Rack			
2	Base rails	1"	1½"	18"
5	Cross pieces	½"	1"	13"

Hardware

1 doz. corner irons and screws.
1 lead pipe ⅜"x4" (drain).
1 sheet galvanized iron 28 gauge 24"x46" or 26"x48".
1 pair hinges.
1 brass drawer pull—for handle.
1 set casters.
1 doz. screws No. 10, 1"¾ R.D. blued.
4 doz. screws No. 10, 1½" F. H.
2 doz. brads ¾".
1 lb. finishing nails 3" No. 10.

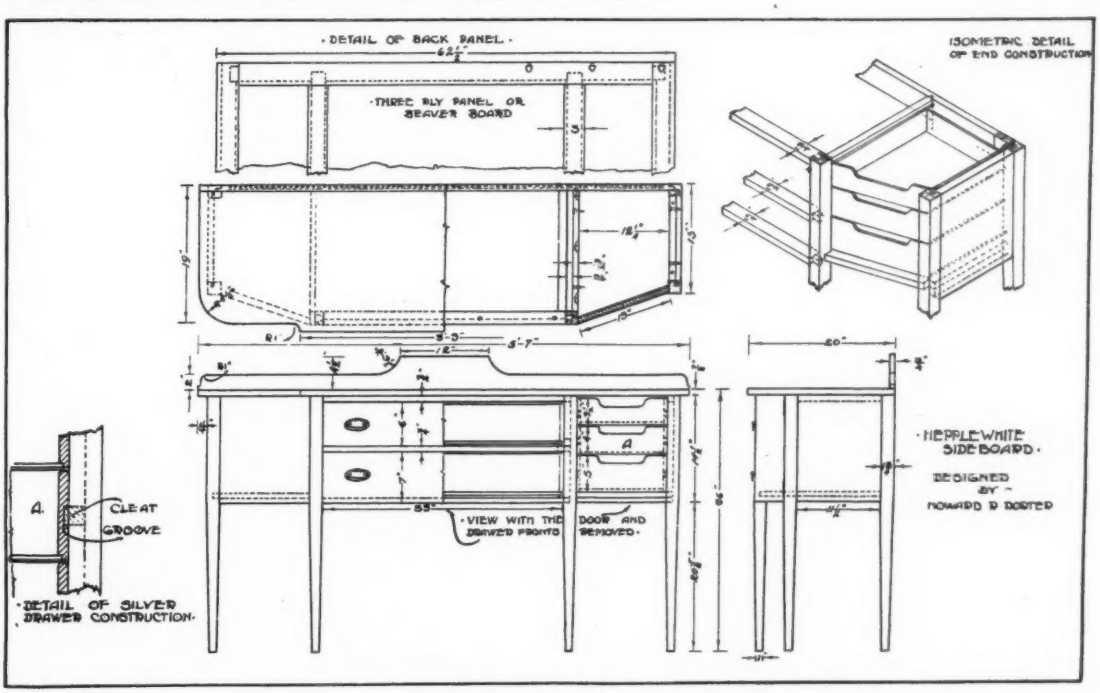
A HEPPELWHITE SIDEBOARD

Howard R. Porter, Dir. Manual Arts, Ellensburg, Wash.

This buffet, or sideboard, is a modified period model that lends itself readily to the constructive ability of the average high school boy. Simplicity and pleasing proportions in design were the objectives. Continuous flush surfaces were desired and the effect was carried out in the drawers, drawer rails, doors and end panels. The latter, as shown in the drawing, are dadoed into the posts, so that the outer surface is flush with them. This was appreciated when the finishing stage was reached and the rubbing was in progress.

A full sized drawing was made of the plan on tough paper and measurements taken direct from this. The end sections were glued up first with cleats at top and bottom to receive the bottom board and the buffet top. These cleats also aid in strengthening the end panels which are of solid material and need protection against warping. The two center front posts were next put together with the drawer rails, the top one dovetailed in place. Then the back panel was built with beaver-board panels, the dividing stiles being located to receive the partitions which are grooved into them. In assembling, the back panel was placed in position between the end sections and the dividing partitions fitted into their grooves in the back panel. The front posts with the drawer rails were then put in place. Lastly, the bottom boards for the end compartments were cut to shape, put in place, and fastened to the cleats already in position. These bottom boards held the structure in the proper shape while the glue was hardening. No rails connect the end and center front posts but a sufficiently rigid and strong construction results from the use of solid bottom boards and the screws that fasten the buffet top in position.

Solid wood, in this case walnut, was used throughout with the exception of the doors which were built up and veneered, both sides. After careful sanding, sponging and resanding, a thin wash coat of shellac was applied. Then without sanding, a paste wood filler colored with Van Dyke brown was rubbed in well with a leather covered pad, and carefully cleaned up with clean pads of cheesecloth slightly moistened with turpentine. The wash coat of shellac protected the high lights and lighter-toned parts of the wood from excessive coloring. After the filler had thoroughly hardened, the surface was lightly touched with fine sandpaper to remove any cloudiness, and a coat of diluted orange shellac applied. Numerous successive coats of white shellac were rubbed to an eggshell gloss.

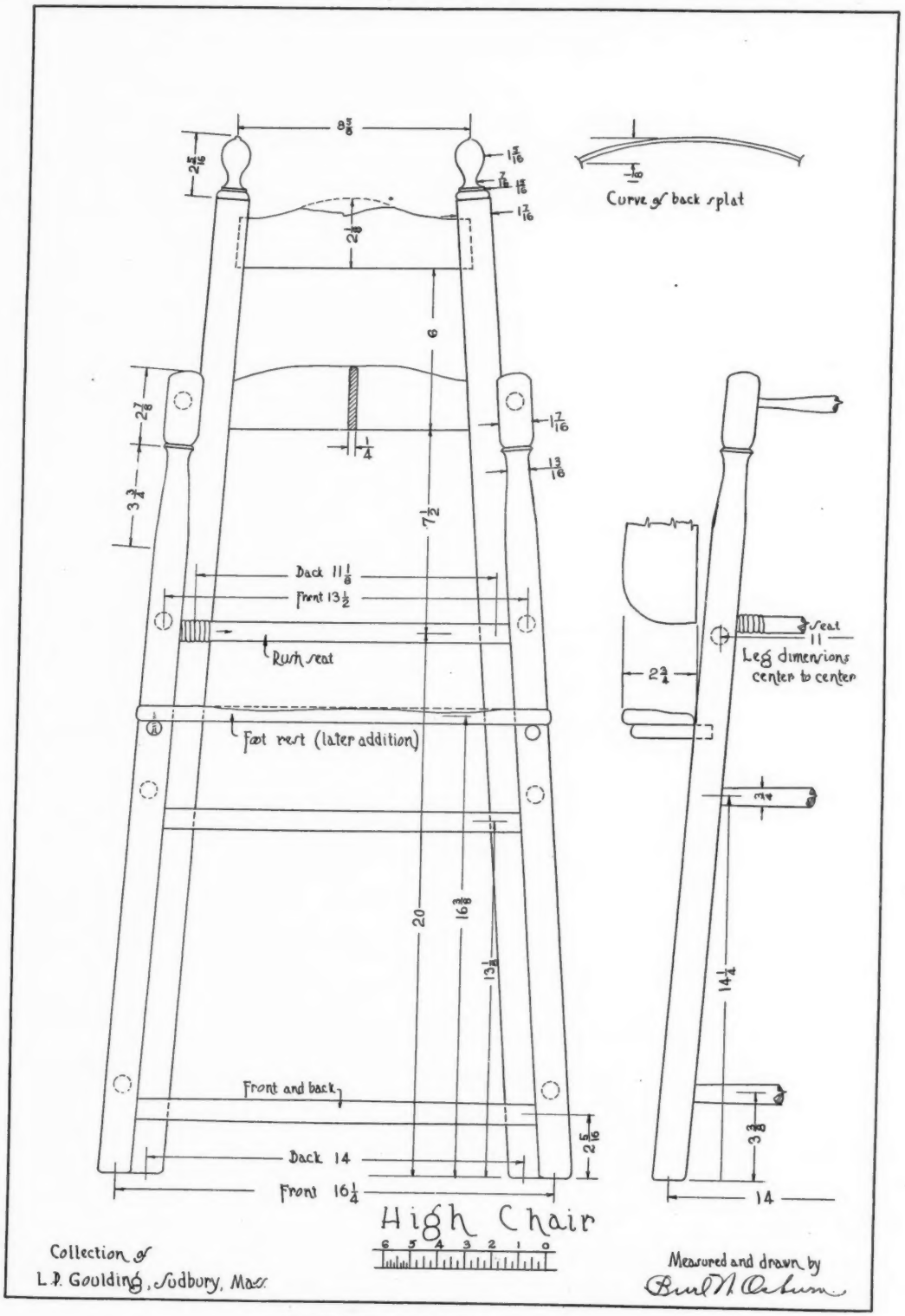

DETAIL OF BACK PANEL
THREE PLY PANEL OR BEAVER BOARD
ISOMETRIC DETAIL OF END CONSTRUCTION
CLEAT
GROOVE
DETAIL OF SILVER DRAWER CONSTRUCTION
VIEW WITH THE DRAWER FRONTS DOORS AND REMOVED
HEPPLEWHITE SIDEBOARD
DESIGNED BY HOWARD R PORTER

DETAILS OF A HEPPELWHITE SIDEBOARD.

A COLONIAL HIGH CHAIR

Burl N. Osburn

This chair is of a type common in this country for over a century. It is simple in design and construction, but well planned; for example, the well-spread feet preventing tipping. Examination of the original shows that the foot-rest is a later addition, although the tiny feet of generations have worn it almost in two. The rush seat is in a good state of preservation. There is no attached table, as in modern chairs; the custom being to have the children sit directly at the table.



DETAILS OF A COLONIAL HIGH CHAIR.

THE HIGH CHAIR.

All parts, excepting the back rails and foot-rest, are turned. The rounds are slightly larger in diameter in the center than at the ends. In fitting them in the legs, it will be noted that side and front (or back) rounds do not enter the legs at quite the same level, thus preserving strength. The side rounds of the seat are above the front and back rounds, thus making a natural seat.

PORCH CLOTHES-LINE HOLDER

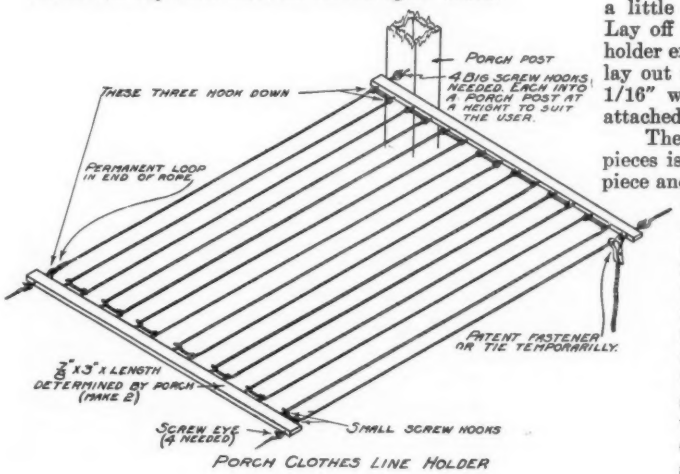
Louis M. Roehl, Ithaca, N. Y.

At such times as rain, cold weather or snow make it impossible to dry clothes on the line in the back yard, the porch clothes-line holder has been found to be a handy and satisfactory substitute.

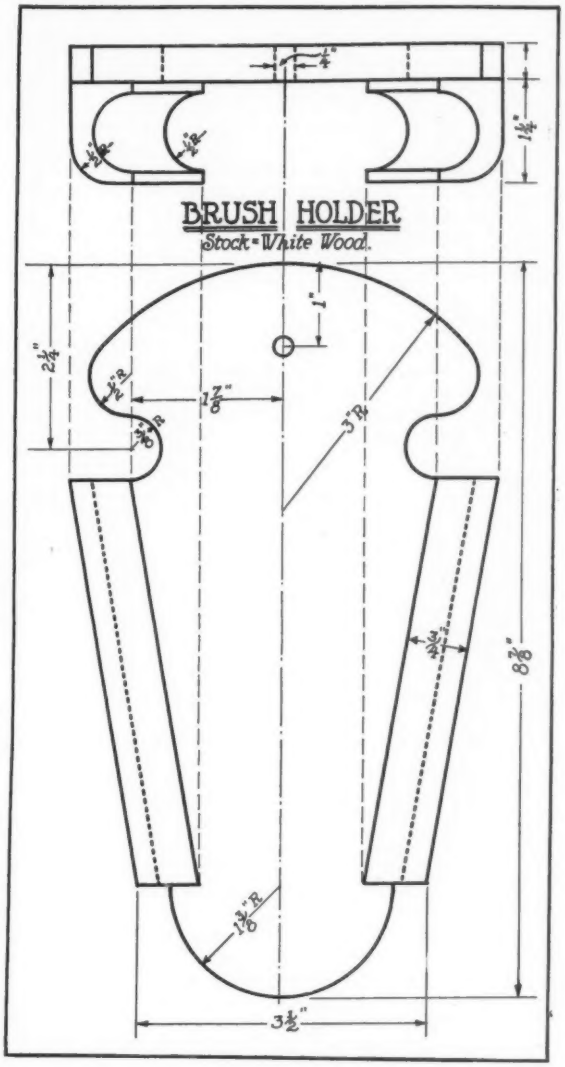
The holder consists of two pieces of soft wood 7/8"x3" and whatever length is needed to reach two of the porch posts; four big screw hooks which fasten into the porch posts and on which the holder is hung; four big screw eyes which are fastened to the back edges of the boards and hang the boards onto the hooks; 30 screw hooks somewhat smaller than those in the posts, evenly spaced at the end of the line, holds it when drawn tightly and dispenses with the necessity of tying each time the line is used.

When the holder is placed on the hooks in the porch posts, it, of course, hangs so that a loop in the end of the line would slip off the first hook if the hook were placed with the point up. So the first hook on one board, and the first two on the other, are placed so as to hook down. All the others are placed with the hook opening up.

When not in use, the line is taken from the holder; the holder is lifted off the hooks, and placed where it is out of the way until need for its use again arises.


PORCH POST
4 BIG SCREW HOOKS NEEDED. EACH INTO A PORCH POST AT A HEIGHT TO SUIT THE USER.
THESE THREE HOOK DOWN
PERMANENT LOOP IN END OF ROPE
PATENT FASTENER OR TIE TEMPORARILY.
7/8" X 3" X LENGTH DETERMINED BY PORCH (MAKE 2)
SCREW EYE (4 NEEDED)
SMALL SCREW HOOKS

PORCH CLOTHES LINE HOLDER



A BRUSH HOLDER

Wm. H. Morton, Walker Manual Training School, Portland, Me.

The back piece is best worked out by leaving the stock a little longer and wider than the finished dimension. Lay off the center of the two 3/4" holes at the top of the holder exactly square with the center line and bore. Then lay out the rest of the design. Leave the tapering edges 1/16" wide for planing down after the side blocks are attached.

The proper bezel for the top and bottom of the side pieces is easily obtained by setting your bezel at the back piece and transferring to them. After cutting the bezeled ends, gouge out the sides and sandpaper with a sound edged block. The side pieces may be attached with No. 4 screws, or by gluing and nailing with 7/8" brads. Do not attempt to curve the edges of the side blocks until they are fastened on to the back. The top of the back piece may then be held in the end of the vise, and the curve on the side pieces worked out with the block plane without danger of splitting the sides. If desired, the top or bottom may be variously decorated by stippling, carving, or a colored design may be put on with poster colors and shellaced.

Auto Mechanics in the High School: Who and What to Teach

Lewis H. Wood, Sioux City, Iowa.

THE study of auto mechanics has been introduced into our high schools so recently that the questions what to teach and who to allow in the classes are very live topics for discussion. In this article the discussion will be taken up from the standpoint of the general high school as it is in this type of school that the variation in procedure is probably the greatest. However, it will be necessary to first state our objectives as these determine very largely the answers to our two main questions.

In the general high school our immediate objective is generally two-fold. First, there are the boys who will never be mechanics but who should become intelligent owners and drivers. Then there are the boys who may spend their lives as mechanics or who at least are interested in going rather deeply into the mechanical side of the work. Both of these groups of boys will come in the same classes; sometimes about equally divided, but usually with a large majority of those who will not be mechanics. Yet we must give both groups, the type of work which they need. If we take for our first year's work a double objective, we can satisfy both these groups of boys. The main objective would be to teach the intelligent care and upkeep of an automobile from the owner's point of view, while the secondary objective would be to lay the foundation upon which to build the specialized training and skill of the mechanic. While these may sound like very divergent objectives to be reached in the same class, yet they can be reached quite successfully and in reality make the work much more interesting and worth while to the boys.

If these can be accepted as the immediate objectives in the general high school, let us see how we are going to arrange our work and whom we are going to take into our classes that we may reach the goal.

The boy is of course our first consideration. He comes to us very much interested and very anxious to work, especially to tear something to pieces and see the inside. Perhaps he already knows a good deal about a car, and his main desire is to bring one into the shop and work on it. Perhaps he thinks that auto mechanics is a "snap" course and comes only because he expects to get by without much work. Whatever the motive, our first job is to find it out, get the boys' point of view, what they want to do and why they want to do it. Then with this information collected we can quite easily check upon our objectives, change them if necessary and rearrange our semester's or year's outline to fit the particular class.

The following is offered as a general outline making possible the objectives stated above, and yet susceptible of almost any amount of changing, rearranging or enlarging necessary to give a class just what it desires.

I—Frames
II—Springs
III—Front axle
IV—Wheels and wheel bearings
V—Brakes
VI—Steering gear
VII—Rear axle
VIII—Transmission
IX—Clutch
X—Universal joints and drive
XI—The body
XII—Tires
XIII—Gasoline engines
XIV—Cylinders
XV—Pistons and rods
XVI—Crankshaft, bearings, flywheel
XVII—Valves, valve gears, cam shaft
XVIII—Fuel system
XIX—Lubrication
XX—Cooling
XXI—Carburetors
XXII—Ignition

The general subject matter for each of these topics should be selected from textbooks or put into lesson form by the teacher so that it may be put in the boys' hands to be studied. During the recitation the subject may be developed as much farther as seems desirable for the particular class; or individual members may be assigned to look up related topics along lines in which they are especially interested. Then, when the class is divided into groups for shop work, the individual boy can be made the basis of the division thereby insuring the most technical work to those who may want it. For one group the shop work may be entirely informational, simply investigating a shop model, while for another it may be vocational and consist of actual work on a live car.

These 22 topics are largely independent so that the order may be varied to suit class conditions, or even parts of topics may be used when necessary. This last is not very good practice, however, as it is hard to give the general information without taking up the whole topic. Also the time devoted to any one topic may vary from a day to several weeks, depending upon the topic and the extent to which it seems desirable to develop it.

In the general high school it is not well to make the work individual to the extent that boys are working on different topics at the same time. This only results in confusion and probably the elimination of practically all classwork. The job assignments must be varied to suit the boy's ability and interest, but new topics should be taken up by the class as a whole through study, recitation, and demonstration so that all may have the full benefit of the discussion.

As has been stated before we must have both classwork and shopwork, but the question is often asked as to the type of shopwork suitable in the general high school. In general this should be suited to the boy. Some boys we can trust to work on live cars, either belonging to the shop, the school, or the boys themselves. Others we must put to work on the shop models to be sure that they will not do any damage. Some people advocate doing commercial work and, in a vocational school with a trade class spending considerable time in the shop, this may be the thing to do. However in the general high school it does not seem desirable. In the first place the work must be guaranteed—it must be absolutely right—and that means that the instructor must try every bolt and nut, check every assembly, and allow nothing to get by without his O. K. An attempt to do this very quickly leads to the instructor actually doing all the work while the boys help, watch, or, as is more likely to be the case under such conditions, play. The boys realize very quickly that they are not getting anything from such work, and besides making life miserable for the instructor they will desert the ship and go where they feel that they are getting something worth while.

Cars belonging to the boys, the school district, or outside parties who are known to the school and are willing to leave their cars in the school shop as long as necessary, may be quite safely taken in for classwork. Even here, care must be taken to have a very definite understanding as to just what is to be done, and what expense is to be incurred before the work is started. There should be enough cars and parts in the shop so that the classes can be kept busy without any outside cars, but a certain amount of outside work is desirable and even necessary to hold the best interest of the boys. Those who can be trusted should work on live cars and those who are not yet at that point want to have that privilege as something to work toward.

In brief, if we can only remember that we are helping a boy to obtain an understanding of the automobile and not teaching a subject and then so organize and equip

our shops that we can keep this boy interested and busy, I believe we will have found the answer to the question, "what to teach."

The second part of this discussion, namely, "whom to allow in the classes," while not as important as the question "what to teach" yet needs some thought if we are to do justice to all.

We might limit the work to seniors, or juniors and seniors, on the ground that as we cannot accommodate all who want to take the work, it is better to limit it to the older, more mature boys. On the other hand we might limit it to freshmen and sophomores on the ground that here we shall give many a chance who will never get farther in school. Drawing, or woodwork, or machine shop, or some other line of shop work may be required first, on the ground that we may thus keep boys who do not seem able to use their hands mechanically out of the class. We may limit the work to boys only, or we may allow girls to enter the classes. These are some of the varying conditions under which our pupils may take auto mechanics.

Just what requirement to make must, of course, depend largely upon the individual school and community, but there are some general considerations which should be taken into account in arriving at the requirements.

Without question any boy who is going to follow a mechanical trade should have the advantage of our automobile shop for a year or more before he leaves school. In fact such boys should have preference over all others. Therefore, if we limit the work to any certain classes, some provision should be made so that these boys may be admitted as special cases. Where the number wishing to take the work exceeds the capacity of the shop, (and this is usually the case) a preliminary registration can be taken and each boy asked to tell why he wants the work in auto mechanics. The head of the department, or the principal of the school, can then go over the cards and select those who should be admitted. This would not be entirely fair, perhaps, but in some ways the boys for whom auto mechanics is almost entirely vocational should be admitted to the class. This applies to the boys from the grades and junior high schools as well as to the senior high students.

For the general high school student there does not seem to be any good reason for requiring other shop subjects before allowing him to take up auto mechanics. As a rule the boys will have had a taste of shopwork in the junior highs or in the grades so that they know pretty well whether or not they like such work; besides auto mechanics is so different that a boy who does not make good in wood shop may make a good mechanic. Perhaps, too, the boy needs just this work to prove to himself that he will not be a good mechanic and he at least will learn something about a car that probably will be of benefit to him later.

In many places there is quite a little demand from the girls for admittance to the auto classes. There is no doubt that girls can profit by a general course in this subject as they too will own and drive cars and so need to make simple roadside repairs and adjustments. However, very, very few will ever do more than change a tire, and it would hardly seem necessary to spend even a semester in the school shop when that is about all the use that will ever be made of what is learned. Then, too, if the girls are really to do this work, they must wear coveralls and get into the dirt and grease, and the ordinary shop is not arranged with the necessary dressing and washing accommodations for girls. Again, if the boys and girls both come in the same class, it is hard to get either one to do real work. If the girls are dressed for their work, they will probably attract too much attention from the boys and, if they are allowed to wear their ordinary clothes, they cannot work and the class easily becomes simply a social hour. If girls are to be allowed to take the work, special classes should be formed for them. Then the work can be changed to better suit the girls, dressing rooms more easily arranged, and the many disadvantages of having boys and girls together will be practically eliminated.

Just a word about classes of adults either day or evening: These classes are much more difficult to handle unless great care is taken to get together a group that wants just the same thing. A class of owners or a class of mechanics all wanting ignition will go very well, but put a few mechanics in with the owners, or mix up mechanics who want welding with those who want ignition and the teacher's troubles begin. With an adult class never attempt anything in which the teacher is not an expert, and always be sure that the class knows in advance just what is to be taken up during any one term.

A little time and study given to finding just what the students of a school need and want, together with a flexible plan of giving the work, and an intelligent selection of the members of the classes will add greatly to the interest and results of auto mechanics in the general high school.

TYPOGRAPHICAL ADVERTISING

C. M. Litteljohn, Washington, D. C.

A course in the subject of composition for advertisements is of most impelling interest today. It is one of the most pertinent of the branches embraced in the modern printing school curriculum. Forming the essence of the highest development of the present day craftsman, it affords an opportunity for the most stimulating maintenance and progression of the ideals and traditions of the art. Through a demonstration of the newer influences that have affected the industry by the growth of advertising, it furnishes a background of important business training of value beyond the industry.

But a school course of this character should only be participated in by those with a thorough previous training and with full preparation in the basic principles of the "art preservative." The assimilation of the elementary printing subjects forms the foundation upon which this additional knowledge may be built. Preferably, a preliminary printing course should be finished before the advanced work is undertaken by the student. The pupil, for example, should be familiar with shop practice, or he should have a year's training in engraving or some other branch assisting him in the acquirement of the higher knowledge necessary.

Opportunity is offered the printing instructor for the inculcation of the finest principles of the craft in the boys. Advertising today absorbes the best that is in the printer. That searching for novel combinations, for new designs, for carrying the appeal, and striking the attention, brings out the best efforts of the practical craftsman. The most effective and interesting work of the printer is recognized to be in the advertising field. In advertising pamphlets, brochures, folders, printed salesmen of one sort or another, or in the inevitable and omnipresent house organs that are now started in elaborate fashion by every tradesman, every professional engineer or landscape gardener one meets, the printer has ample opportunity to demonstrate the best that the printing art affords. Even the plain composition in newspapers, without fancy or selected stock, deckle edge, or ample space for the development of marginal balance is influenced by fine typography in the hands of the trained student of artistic decoration, ornament and illustration.

With such a wide range of types from which to choose, there being nearly one thousand different faces included in a recent catalog, and with new ones being added each day to convey their message in just the right tone of voice, by proper placing and handling, a whole vista is opened for the development of conspicuous talent, judgment and appreciation that will make itself felt in the printing, advertising, publishing and allied worlds in which the present day printer wields his "stick."

Something of the value of advertising and the essentials of this science as a medium for compelling interest, for striking attention, and for conviction and persuasiveness is also learned in such a course. But too much stress cannot be placed on creative printing and the development of new designs and combinations that express the subject in the most appropriate manner.

A STUDY OF THE LEARNING DIFFICULTIES OF VARIOUS TOOLS

A. P. Twogood, Iowa City, Iowa

Last year I was called upon to construct a detailed course of study in wood working covering two hours per week for the seventh and eighth grades. Working on the assumption that tool processes should be presented in the order of their learning difficulty I prepared the accompanying questionnaire, which was distributed among three classes of individuals: teachers of woodworking, carpenters, and high school pupils.

The results obtained from the carpenters were, on the whole, very unsatisfactory. These men are not in sympathy with the manual-arts movement and, hence, did not take the questionnaire seriously. The majority of them checked only a few items, and these reflected little thought. I could classify the men of my own acquaintance into good, medium, and poor mechanics on the basis of their questionnaires. The poor mechanics checked all tools "easy," the medium mechanics "difficult," while the good mechanics had very good distribution from "very easy" to "very difficult." Only these latter replies were used in tabulating the final results.

The replies submitted by high school pupils were better, but not very reliable due to a misunderstanding as to just what was desired. This group did not recognize that the learning-difficulty scale might vary from the manipulation-difficulty scale. Only a few of these could be used.

LEARNING DIFFICULTIES IN TOOL PROCESSES
Final Scores from Questionnaire

Tools	Very Easy	Easy	Average	Difficult	Very Difficult
Try-Square	18	42	31	4	..
Gage	3	16	32	32	13
Mallet	60	26	7	..	..
Compass	6	37	42	9	..
Jack Plane	1	17	49	21	6
Back-saw	8	18	42	23	1
Mortise Chisel	4	9	43	27	7
Rule	35	34	21	5	3
Scraper	10	25	29	16	15
Framing Square (Squaring Only)	3	11	34	18	23
Smoothing Plane	2	19	45	28	4
Rip Saw	4	23	42	25	4
Nail Set	41	33	17	2	..
Miter Square	6	19	25	24	8
Compass Saw	2	10	26	30	19
Jointer Plane	2	11	25	33	13
Cross-cut Saw	3	28	43	18	3
Bevel Square	2	13	34	32	6
Chisel	8	30	37	18	2
Coping Saw	8	24	28	29	4
Block Plane	4	23	31	20	7
Screw-driver	46	33	14	2	..
Gouge	2	12	35	31	7
Turning Saw	2	5	24	40	10
Wood Rasp	20	27	34	11	1
Oil-stone	12	18	37	24	5
Brace and Bit	13	27	44	11	1
Hammer	42	39	13	3	3
Iron File	12	28	26	12	3
Counter-sink	34	39	13	3	3
Spoke-shave	3	11	32	30	11
Hand Drill	8	29	36	12	3
Draw-knife	7	18	24	22	10
Dividers	5	26	36	17	6
Combination Plane	..	4	15	28	32
Clamps-Hand and Cabinet	3	20	35	23	3
Knife	33	33	22	2	..
Total	472	827	1123	685	236

The results obtained from teachers of woodworking were very satisfactory. These men recognized the need for careful thought on the subject, and contributed accordingly. Without their help the study could not have been a success. An interesting sidelight on the study is that the greater the experience of the teacher, the more nearly his distribution curve approaches the normal distribution curve.

The schools which contributed material are Des Moines, Waterloo, Cedar Rapids, Burlington, Ottumwa, Clinton, Grinnell, and Iowa City. The study was made under the direction of Prof. T. J. Kirby, College of Education, State University of Iowa, whose suggestions and criticisms were highly valuable to me. The accompanying tabulation showing final results may be of value to some school confronted with the necessity of reorganizing its course in woodworking.

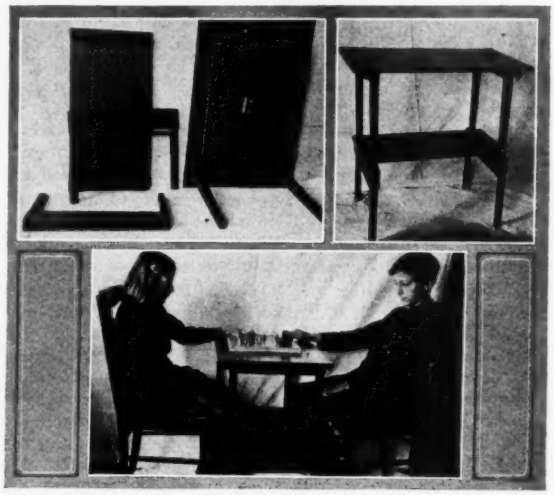
A TABLE WHICH GREW UP WITH THE CHILDREN

A Problem in Household Mechanics

William L. Goggin, Phoenixville, Pa.

My young folks have a small folding table to which they are very much attached. It has been a favorite play piece since pre-kindergarten days. As the years have skipped along and legs and bodies stretched, the children have clung to it in preference to all other tables.

Noticing their bowed backs as they bent over a game one day, I decided to see if it could be changed. It must meet their present needs and still keep its convenient,

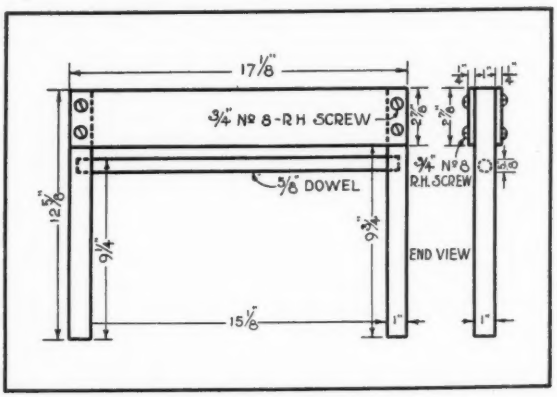


THE TABLE DISASSEMBLED, ASSEMBLED, AND IN USE.

collapsible form which endeared itself to the children, as they like to carry it about the house or to the porch in summer.

The problem was solved in this manner, and since it has been accepted with delight by the young folks, I offer it as a suggestion to other parents or teachers who may face a similar problem.

I made two pairs of extension legs into which the table legs set snugly against a dowel rod (see illustration). The table may be quickly and easily lifted off, and the pairs of extension legs carried in one hand. Across the extension legs is a board with two cleats on the bottom



DETAILS OF THE EXTENSION LEGS.

fitting into the open spaces between the extension legs. The board also provides a convenient shelf upon which to set games when not in use.

My son can now unfold his "jack knife" legs, and my daughter straighten her shoulders while they still play at "old friend table."

STORING THE PUPIL'S WORK MATERIALS

A difficulty which often confronts teachers in art, science, and mechanical drawing classes is the storing of the student's working materials. This problem has been satisfactorily solved in Waukegan, Ill., with the use of a storage cabinet.

A simple table of ordinary height with space for one drawer in the rail of the table is provided for each student of a group. Usually 25 or 30 students comprise a class and these are provided with individual drawers which are kept in the storage cabinet when not in use. Each drawer is labeled with the pupil's name, and has a lock and key. This lock is placed in a key cabinet which is kept under the direct supervision of the teacher, and is kept closed except for a short time immediately preceding and following classes.

As a student comes to class, he gets his key from the cabinet, takes out his drawer, and places it in the opening of the rail of his table. This process is reversed at the end of the class period, when all the drawers are replaced in the storage cabinet, and the room is ready for the next class.

This plan makes the tables available for as many classes as are necessary during the day, and does away with the necessity of an expensive table containing a set of four or six drawers to which no additional drawers could be added. However, in the case of the storage cabinet, sections may be bought as these are required, making the system flexible as well as practical.

TYPICAL STORAGE UNIT, KEY RACK AND TABLE USED IN THE WAUKEGAN HIGH SCHOOL.

NEW BOOKS

Imposition

Group six of Standard Apprenticeship Lessons for Printers. Nineteen pamphlets. Published by the United Typothetae of America, Chicago.

This series of lessons covers platen press and cylinder press lock-up and constitutes a comprehensive study of principles and methods accepted by the best present-day printing offices. Each lesson includes two to seven practical jobs and a group of questions for collateral study. The lessons constitute a notable contribution to the practical literature of vocational courses and explain in large part why courses for printing apprentices are among the most effective and uniformly satisfactory of all trade courses.

Courses of Study in Manual Arts

Prepared by instructors in the Duluth, Minn., schools. These pamphlets cover respectively the courses in sheet metal, wood turning, woodworking, and forging in the seventh grade; printing, electricity, in the eighth grade; mechanical drawing, machine woodwork, in the ninth grade; pattern making, foundry work in the tenth grade; machine shop practice, mechanical drawing in the eleventh grade; and mechanical drawing in the twelfth grade.

American Type Design in the Twentieth Century

Specimens of the outstanding types produced during this period. By Douglas C. McMurtie, with an introduction by Frederic W. Goudy. 61 pages. Price, $1.75. Published by R. O. Ballou, Chicago, Ill.

Comparatively few printers, and even fewer readers, know or appreciate the many stages of development through which letters have passed to reach their present forms, symbols that have become so familiar as to be commonplace.

This book takes the form of a record of achievement in American type design in the twentieth century. Containing as it does, actual specimens of one hundred modern types selected for their fineness, it acts as a complete guide to modern type selection.

An introductory note by F. W. Goudy, the leader of modern type designers, sets forth the principles of good design and gives the volume an especial value as an important contribution to the literature of printing.

The book offers a complete review of the several types of design available to the American compositor and represents a varied and extensive gathering of the type founders and composing machine makers in one volume. Each type face, as shown, is criticized concisely and completely by Mr. McMurtie, who points out that the most recent progress in this field compares favorably with that made in type designing circles in any country in Europe. Not only a great number of new faces have been brought out in the last two decades but the merit of the designs has been such as to place the United States products in the front rank of the industry.

Fundamentals of House Wiring

George A. Willoughby. Cloth, 67 pages, illustrated. Price, $1. The Manual Arts Press, Peoria, Ill.

The present book owes its existence to the fact that the author recognized the great need and the entire lack of suitable material for presenting the fundamentals of house wiring to pupils in school shop classes. He early recognized the value of a course of this character and the need for information necessary to place the work before the pupils in a clear, concise, and practical manner.

The material contained in the book is of a practical nature and is intended to serve as an aid in arranging work for shop classes, or as a guide to the handy man in wiring his own home, garage, or summer cottage. The book takes up fundamental points to be understood in connection with electrical installations and proceeds to a study of service arrangements and cabinets, the wiring of new buildings, conduit and armored cable work, and installation work in finished buildings. A summary and list of questions appear at the end of each chapter making it possible to emphasize work previously covered and to bring out new points in connection with the topics.

The book is entirely practical in its arrangement and make-up and may well serve as a text for the school shop, or as a reference book for the student.

HOUSEHOLD MECHANICS IN CORVALLIS PUBLIC SCHOOLS.

A. R. Nicols, Supervisor of Trade and Industrial Education.

In order to enrich the manual training course of study, many manual training instructors have been trying to make all the contacts possible with industry. In the Corvallis public schools such contacts were made through a course which, for want of a better name, is called household mechanics. This course can also be made a definite "tryout" course, as it brings in many of our trade occupations.

The purpose of the course is to give the boy a knowledge of the use and care of the different objects about the house, such as the door bells, electric switches, electric irons, etc.

The course consists of the following:

1. Sharpening Tools—Study of the methods and practices in sharpening bevel and wedge-edge tools, saws and lawn mowers.

2. Soldering—A study of the principles of soldering; and practice in the use of the soldering iron, and in making some minor utensils.

3. Nails and Screws—A study of the correct use of nails and screws, applied on some special problems under construction.

4. Locks—A study of different kinds of locks, and their mechanism, with practice in the setting of locks.

5. Hinges—A study of the sizes and kinds of hinges, and practice in setting hinges.

6. The Range Boiler—Circulation of warm water, illustrated by experiments. Connections and methods of heating.

7. Faucets—Types of faucets. Specifications and repairs.

8. Traps—Kinds and purposes of traps. Ventilating; with actual practice in cleaning.

9. Electric Bells—Electric door bell construction; current supplied by cells or transformers. Bell wiring problems.

10. House Wiring—Principal parts of house wiring system. Testing and replacing of fuses.

The equipment for this course is very inexpensive, as a comparatively small amount of equipment is allowed for each subject.

The class was divided into small groups of from three to five pupils, each group taking up a different line of work. This means a rather high degree of organizing ability on the part of the teacher, to keep all pupils profitably employed. He will need to appoint "subforemen" for the different groups, these pupils having done the work, so as to be able to show the right methods.

This course must be worked out carefully before the class comes in, in order that the teacher may have solved any difficulties ahead of time.

This is the most interesting course ever undertaken in the Corvallis public school. Not only pupils, but parents and teachers, are agreed that the interest is the best they have ever seen.—**The News Item, Salem, Ore.**

ELEMENTARY MANUAL ARTS LESSON PLANS

Arthur O. Gardner, Madison, Wis.

Courses of study as determined by boards of education, supervisors, and principals act only as a guide as to what should be accomplished by the instructor in any course. The greatest work, that of developing the life of the boy cannot be outlined.

The manual-arts work of any given grade is usually determined by the general aims of the course and is limited by what has been taught in the grade preceding and what will be expected in the grade following. The instructor must, therefore, get a general or "bird's eye" view of the demands of the whole course. With this knowledge he must thus develop his working plan on a smaller unit.

The concensus of opinion of teachers is that their plans for a given block of work are completed when they have determined answers to the following three questions: 1. What am I going to teach? 2. How am I going to teach it? 3. Did I "put it across?" These three questions when put into indicative form result in (1) the problem, (2) the solution, and (3) the verification. Academic teachers usually put the answers to number one in their plan books. Then they determine their method of teaching and make up their tests, quizzes, and examinations. The criticism to be offered in this connection is that too much use is made of deductive teaching. Too many directive statements without intensification are made. Instructive questions of an inductive nature, which require the student to discover as much as possible for himself, are seldom used. Instructive questions make for better teaching.

Education implies progression; progression implies forethought.[1] In order to progress educationally with greatest success with respect to time and money, plans must be made. The forms on which these plans are made do not determine success or failure in carrying out the work. But better success is assured if the plans are made out as follows:

1. Make plans of complete workable blocks which may cover from one to four weeks of work.

2. Subdivide the blocks into smaller units which may be on the daily or weekly basis.

3. Determine and put down in the plans instructive questions. This should be done by the instructor in order that he will form the habit of "working through" his talks and demonstrations before giving them.

4. Keep the plans so that they can be used either for references or as a guide by a successor.

The above method need not be put in a so-called lesson-plan book, which is so often misused by academic teachers when they put down in their plans a notation such as this: "Take from page 263 to page 293'.' A book is of advantage to a successor, but loose-leaf plans properly bound and filed can be made to serve the same purpose.

Manual-arts plans must be so worked out that higher types of thinking are made use of. It is easier to tell and show, but better results are obtained through the use of instructive questions.

After plans are made, entire dependence upon them is to be avoided. "It killeth the spirit." The major purpose of a lesson plan has been served when it is written. The instructor knows what and how he is going to teach, and how he is to look for results. Plans cannot be more than a handy reference after that, for the plans of mice and men "gang aft astrae" aspecially in large school systems with their many delays and interruptions.

THE SHOP TEACHER AND HIS LESSON PLANS

V. E. Nylin, Minneapolis, Minn.

Usually a superintendent, who is desirous of keeping in touch with the progress of all his teachers and their classes, demands that all teachers keep plan books which are to be turned in for weekly inspection. Many times the industrial-arts teacher feels that there is nothing to be entered in these books and consequently that they are worthless except to satisfy the whim of a superintendent.

My experience has found the following method of keeping plans effective:

I. In the plan book offered to the superintendent I have outlined projects, information, and skills to be mastered during the week.

The value of this is in keeping a record of the progress made and definitely stating the aims and objectives I am working for each week.

II. For the definite lessons and projects, I have found that in working out a lesson plan, necessary job sheets, and methods to be used, must be carefully worked out in detail.

On completion of these projects, the plans are carefully filed away, and when similar problems arise later, the material and information are at hand when needed.

As new methods, materials, devices, or information appear in the form of books or articles in the magaines, these are added to the files with the related problems for use when needed.

III. For filing the lesson plans I have used regular 8"x10" vertical letter files. At the end of the year the plan book is filed. It usually shows where improvement may come the next year, by showing work well done as well as work overemphasized or underemphasized.

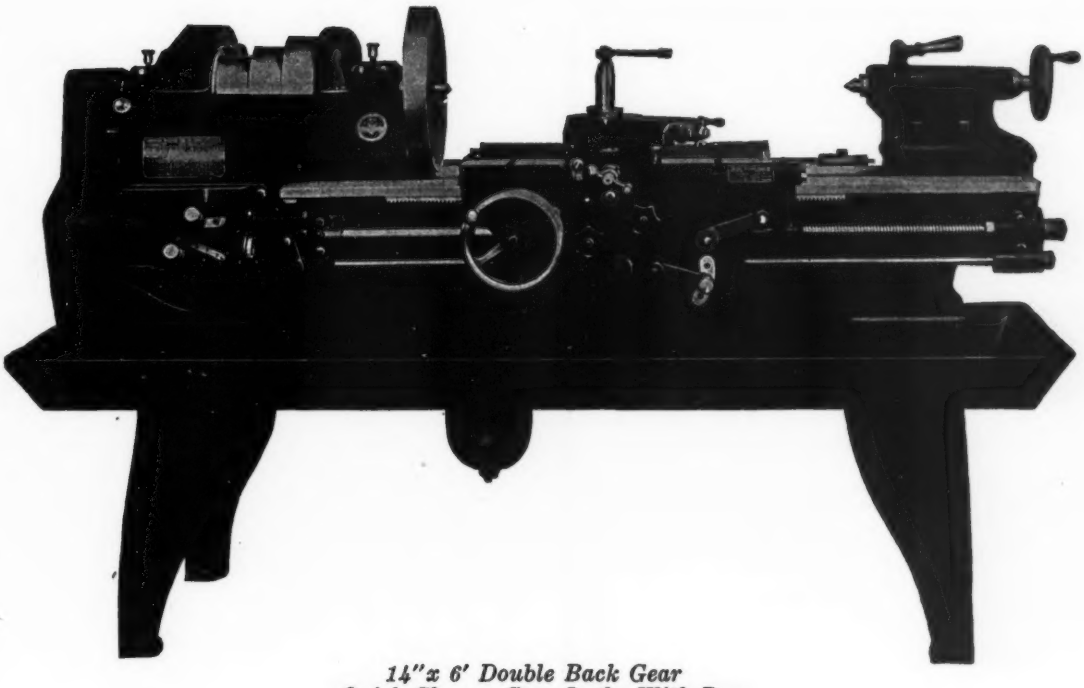
Manual Training Tests

475. Q: I want to secure a list of standard tests in shop work as an aid to some special work we are doing in summer school on the use of tests.—D. C. M.

A: The chief publishers of tests and test materials are the World Book Co., Yonkers, N. Y., and Chicago, Ill. The best tests are Stenquist's. The following tests are in use:

Stenquist's Mechanical Tests, $1.50, World Book Co., Yonkers, N. Y., and Chicago; Wardner's Tool Tests, C. A. Wardner, Jackson, Mich.; National Intelligence Tests, Haggerty and Terman, $1.45, World Book Co.; Sunbury General Shop Accomplishment Test for Grades 8 and 9. Published by W. E. Steiner and W. A. Geesey, Sunbury, Pa.

[1] Ira- S. Griffith—Teaching Industrial Arts.



14"x 6' Double Back Gear
Quick Change Gear Lathe With Pan

More Monarch Lathes are being used in manufacturing plants throughout the country than any other make. More Monarch Lathes are being installed in Manual Training Departments of schools than any other make of lathe. The student, upon completion of his school work, will find himself coming in contact with Monarch Lathes in most shops.

Monarch Lathes are built in sizes ranging from 9 inch to 30 inch swing, and bed lengths from 2½′ to 30′.

Our Engineering Department will gladly submit plans and layouts for machine shop installations and we are in position to give Vocational Instructors valuable information and plans, for which no charge is made.

There is a Monarch Dealer near you, who will gladly show you the merits of Monarch Lathes.

Let us send you Special Vocational Bulletin.

THE MONARCH MACHINE TOOL CO.

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Largest builders of high grade engine lathes and specialists in lathes for Vocational Training.

The Nation's Pattern Lumber

California Sugar Pine

-A TRUE WHITE PINE

California Sugar Pine is a *genuine white pine*, and is so pronounced by botanists and wood technologists. By pattern makers it is considered a worthy successor to "cork" or "pumpkin" pine of the eastern and lake state forests.

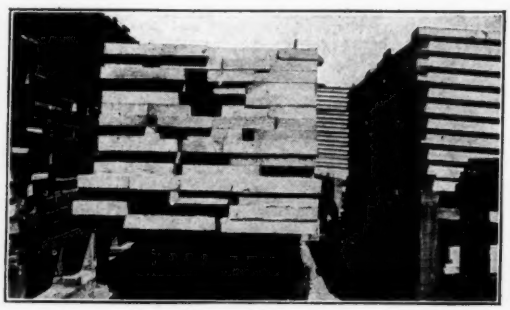
In fact, the cell structure of California Sugar Pine is so similar to eastern white pine that often the microscope can detect no difference. Tests made at the Forest Products Laboratory at Madison, Wisconsin, reveal that California Sugar Pine is a western counterpart of eastern white pine. In specific gravity it comes within 3-1000 of eastern white pine; in volumetric shrinkage from green to oven-dry, it comes within ½ of 1% of eastern white; in softness within 7%, and in strength (as beam or post) within 2% of eastern white. This is a smaller variation than might be expected between different pieces of *Pinus strobus*.

The demand for California Sugar Pine is increasing throughout the United States, while it has been used for a half century on the Pacific Coast. It is bought in the same grades as the old "cork"—with the added advantage of greater thicknesses and wider widths. Any size pattern can be made from California Sugar Pine without having to glue up small pieces.

Be sure to specify "California Sugar Pine" when you want the best pattern lumber. If your local dealer cannot supply you, write or wire us at once. Our wood technologist, formerly of the U. S. Government Forest Products Laboratory, Madison, Wisconsin, will immediately reply to your questions and tell you where you can get exactly the stock for your needs, at the very lowest price.

California Pine ASSOCIATION
463 CALL BLDG. SAN FRANCISCO.

CALIFORNIA WHITE PINE CALIFORNIA SUGAR PINE
CALIFORNIA WHITE FIR · DOUGLAS FIR · CALIFORNIA INCENSE CEDAR



California Sugar Pine Pattern Stock

NEWS AND NOTES

Ten Thousand More Students. The New York City school authorities expect an added attendance in the continuation schools of 10,000 pupils. The board of education has taken steps to appoint more teachers for the work.

At the request of George J. Loewy, director of vocational activities, the committee voted an allowance of $832,707 for 284 shopwork teachers in 1925. Mr. Loewy had asked for 300 teachers at a cost of $854,249. Ten of the new positions authorized are on account of new buildings to be opened which will require five additional shopwork teachers in February and five in September. The other two positions were for the extension of shopwork classes in existing school buildings to meet the demand caused by increased registration. This year Mr. Loewy was granted $795,420 for 272 shopwork teachers.

Bricklayer Apprentices' Night Schools. The bricklayers' apprentices of New York City must attend evening vocational schools two hours for two nights each week. This order is the result of a agreement between the department of education and the employing masons and the unions.

The plan of apprenticeship training grew out of a realization by the various employers' associations that some sort of program ought to be arranged to train future workers for their trades. Officials of labor unions became interested when it was brought to their attention within the past few years that many of their apprentices could not speak English, that some of them had never gone any higher than the sixth grade in the elementary schools, and that many were opposed to further education, and that with apprentices of such type it would be impossible to train skilled mechanics.

Changes in Trade School. The name of the Milwaukee Girls' Trade School is to be changed to Girls' Trade and Technical High School. The trade school is to embrace trade, technical and junior high school departments, and is to be provided with a vice-principal on the same basis and time schedules as the boys' school, with the opening of the new school year. English will be a required subject for graduation and all pupils must complete at least a year of civics or United States history.

Report on Prevocational Work. An extensive report on prevocational work was recently presented by Mr. E. R. Whitney, superintendent of schools at Schenectady, N. Y. The field covered included surveys in Erie, Buffalo, and Rochester and the report attracted a good deal of interest.

Reduce Vocational Positions. The New York City board of education has eliminated eight teaching positions from the budget for vocational and trade schools for the next year, leaving a total of 224 positions as against 232 in 1924. The positions eliminated were those allowed for the Brooklyn Vocational School and were contingent upon leasing an additional floor in the building.

School Plans Prepared. The building committee of the Buffalo, N. Y., school board has received the plans for the new Peckham Vocational School. The building will be located on park property and will be the last word in vocational school architecture. The arrangement of machinery and other equipment makes it an ideal structure for school shop purposes.

Building Trades School. A vocational school for the training of apprentices in the building trades has been opened at Dallas, Texas. An initial fund of $500,000 has been raised for the support of the school. Students at the school will devote one-half their time to learning the theory of the trade, and will put in the other half in actual employment.

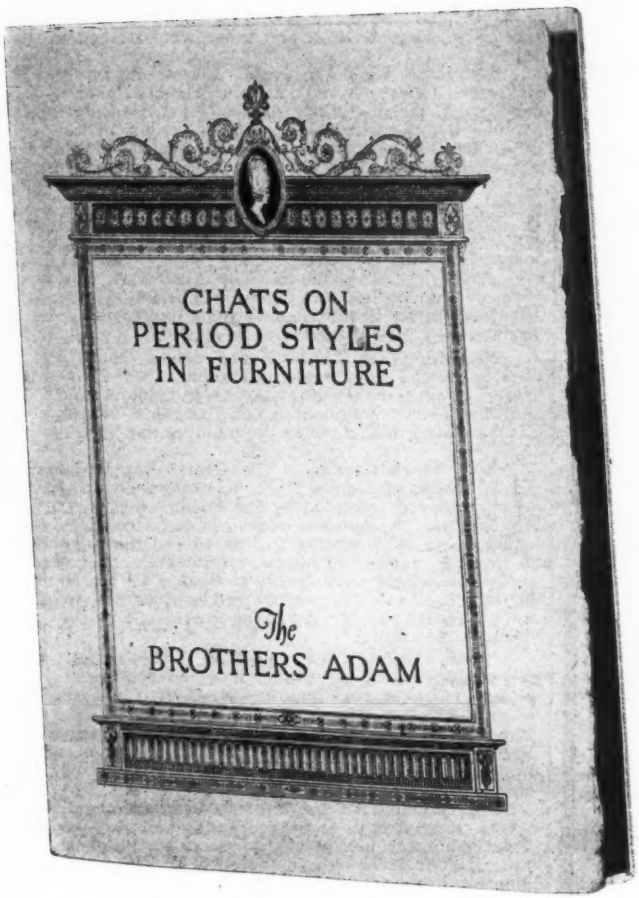
Receives State Allotment. The school board of Rockford, Ill., has received $6,843 from the state as its allotment of the fund distributed among cities of the state for the support of a department of industrial education. The amount given to Rockford is larger than that given to any other city, excepting Chicago, Joliet and Cicero.

School Built by Students. The prevocational school built by the boys of the prevocational department at Stockton, Cal., was opened to the public on June 13th. All work on the building, including the foundation, was done by the students with the cooperation of local business firms.

New Vocational School. The Independence Consolidated School at Senatobia, Miss., has been added to the list of schools teaching vocational work. Miss Arizona Times has charge of the work.

Vocational Teachers Receive Diplomas. A total of 88 special teachers of vocational subjects were given diplomas on June 16th by the Division of Vocational Edu-

(Continued on Page 24a)



The Second of the Series

"CHATS ON PERIOD STYLES IN FURNITURE"

is an interesting and intimate view of the

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and the furniture and architecture to which their name belongs---

This book is free to all Teachers and Directors of Vocational Education having under their charge directly or indirectly the activity of Cabinet making.

To all others a charge of 25c per copy to cover the cost of printing and mailing will be made and that amount in stamps or coin should be enclosed with request for copy.

American Wood Working Machinery Company

Educational Department

ROCHESTER - N. Y.

DIXON'S ELDORADO

"The master drawing pencil"

THE responsiveness of a pencil emphasizes its value as a medium.

Even in the most rapid sketch. Dixon's Eldorado runs the gamut from black to gray—no matter how delicate the line or subject.

Teachers: Write for samples.

Joseph Dixon Crucible Company

Pencil Dept. 128-J

JERSEY CITY, N. J.

(Continued from Page 22a)

cation of the University of California. The students were divided into two groups: those who completed courses in August, 1923, and those who finished in June, 1924.

Instructors Build Furniture. Instructors in vocational classes at Johnstown, Pa., have constructed chairs, desks, cupboards, shelves, filing cases and tables during the summer months which is expected to result in the saving of several hundred dollars. At the Cochran Junior High School, the instructors were engaged in making furniture and in repairing furniture, tables and chairs for use in the schools this fall.

Under the arrangement with the board, lumber and materials were purchased by the school system and the instructors were employed for ten weeks. The metal work was done by C. O. Bowman. The other work was divided between the Garfield and Cochran Schools. The work has been carried out in this manner for a number of years and has resulted in substantial savings to the school district.

Provide Trade School. The school board at Port Hurton, Mich., has leased a building owned by a local motor sales company for use as a trade school. New machinery and equipment which the board has purchased will be moved in as soon as the building has been fitted for use.

Will Teach Carving. The Grand Rapids Vocational School at Grand Rapids, Mich., has taken over the carving school formerly operated by the Furniture Manufacturers' Association. A complete course in hand carving, spindle carving and hand turning will be offered for boys wishing to become expert furniture craftsmen. The manufacturers' association has agreed to donate all the equipment in its school and the present school quarters, to furnish work and designs for students, and to aid in the sale of the school's output.

Trade Training for Plumbers. Vocational training for apprentices in the plumbing trade has been provided along somewhat new lines at Freeport, Ill., according to a plan outlined in a recent issue of the Illinois Master Plumber, by J. F. Manion. Since the overcrowding in the Freeport high school made instruction in the school an impossibility, the plumbers cooperated in organizing classes to fill this need.

"A committee consisting of seven members, four of whom were masters and three journeymen, was appointed. This committee has in charge the instruction of the apprentices; it prescribes the subjects to be taken up, holds monthly examinations and selects the men engaged in the plumbing industry to personally instruct the apprentice.

"The most expert workmen are selected to instruct on any particular subject. For instance, it is the policy to select the best lead worker in the city to instruct boys in wiping and making solder joints. The man most versed on pumps is selected to teach pump work.

"At least one meeting is held each month, on a regular night, and all apprentices are required to attend that meeting. They are given an examination on the subject that had been assigned for study on the last previous session, about one and one-half hours being allotted to a written examination; they are given about one and one-half hours of personal and expert instruction upon some predetermined subject. There are so many phases of the plumbing business that a full three years can be allotted to this work, without a repetition of subjects. For example Cleanliness and Courtesy Appreciated by the Customer, and Avoidance of Accidents. Salesmen of various specialties will from time to time tell the apprentices all about the articles they sell.

"If the apprentice cannot learn, is too lazy to learn, or becomes lukewarm in his desire to become a skilled plumber it becomes manifest before a great amount of time has been lost on him and the master plumber discharges him and puts someone in his place who will learn and become a credit to the craft."

Part-Time Pupils Earn While They Learn. Forty thousand children attended continuation schools last year in Pennsylvania, and at the same time contributed a total of $12,000,000 toward the support of their families. More children were enrolled in the Pennsylvania schools than in similar schools in most of the states of the Union, while the per capita cost for salaries of teachers was less than half the average paid by other states for this purpose.

Progress in Vocational Education. The vocational schools of Baltimore, Md., have come to occupy their legitimate place in the educational program of the city. Large numbers of boys have been attracted to the trade

(Continued on Page 26a)

PRINTING

The Modern Educational Tool

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Science–The theory of light, heat and electricity should always be correlated with Printing. The laboratory problems should be the making of paper, ink and printers' rollers.

Superintendents of schools and principals are urged to request further information about Printing–the Modern Educational Tool. Write to

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(Continued from Page 24a)

classes and to the Mergenthaler School of Printing. Employers have been awakened to the need of the schools and have shown their willingness to support the vocational program by employing the graduates of the schools.

To show the rapid progress of the work, it has been decided to use the original buildings of the Vocational School at Front and Lombard streets entirely for auto mechanics and its allied branches, including pattern making, drawing and the related subjects. The shops are modern in every respect and are large enough to accommodate an increased enrollment.

The most important addition to the school accommodations is the old School No. 93, which has been remodeled for the housing of the electrical shops, featuring bell and electric wiring of all kinds, switchboard work and testing. A feature of the equipment will be the model house installed as a means of teaching house wiring. The first floor of the building has been reserved for the machine shop, cabinet and carpentry shops, one classroom and an office. Modern tool rooms are located in each shop and a paint and finishing room is a feature of the wood working department. New machines and equipment have been installed as a means of further enlarging the scope of the work.

Elementary Engineering Offered. The Stuyvesant High School, New York City, offers an opportunity to young men who desire to pursue a course in engineering. Students who have completed the regular course in physics may elect a course in applied mechanics, applied electricity, or both with complete laboratory facilities superior to those of the smaller colleges.

Under the plan, two periods a week are devoted to laboratory work and the classes are divided into groups, usually of four members each. As many as five or six groups study as many different machines during the same laboratory period, following a rotating schedule until each group has completed the round of experiments. A lecture each week and two recitations serve to teach the physical principles and commercial uses of the machines.

In applied mechanics, the students take their turn in learning to operate types of the steam engine, a gas engine, air compressor, reciprocating and centrifugal pumps, engine condenser and water wheel. Later they make use of brakes, engine indicators, speed indicators, pressure gauges and similar apparatus to measure the power and efficiency of these machines.

In applied electricity, the students start with simple inspections of dynamos and motors which teach them to use the information on data and name plates furnished by the manufacturers; they next meet the same machines in running such simple tests as the determination of the magnetization curves; then follow the external characteristic curves, operation of dynamos, efficiency tests, motor control methods and the operation of generator sets. Later instruction is offered on transformers, polyphase generators, induction and synchronous motors, and radio communication.

Students who do not go to an engineering college find this knowledge of some practical use to them after graduation from high school. A few find positions in power plants, shops or laboratories where a knowledge of these subjects is of advantage. Some become salesmen for engineering firms where they make a practical use of the vocabulary they have acquired in the laboratory and classroom. The results indicate that the amount of time and money spent on the equipment has earned dividends steadily for the students. Also, the instructors have derived great pleasure in seeing the boys grow in a proper understanding of elementary engineering as commercially applied.

Offer Industrial Short Courses. The United States Forest Products Laboratory at Madison, Wis., is offering a series of industrial short courses during the month of September. The arrangement of the courses makes it possible to take two or three courses in succession. Several combinations are possible, such as kiln drying and glue, box and glue courses, wood properties, and gluing of wood. Attendance is limited to approximately fifteen students in each class. A fee of $150 is required for the course in kiln drying and $100 for each of the other courses.

Stout Summer Session. The nine weeks' summer session at Stout Institute, Menomonie, Wis., opened on June 23rd, with an enrollment of 247 men and 157 women. Students in attendance are enrolled from vocational, industrial and home economics teaching positions.

(Continued on Page 28a)

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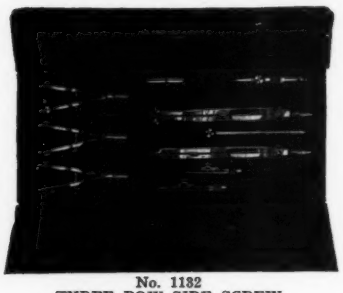

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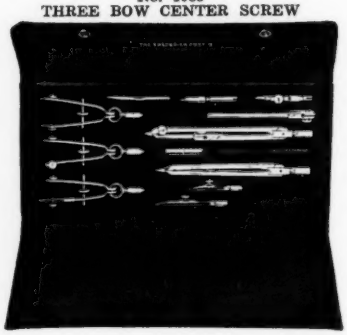

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(Continued from Page 26a)

In connection with the summer courses, arrangements have been made for a number of feature entertainments during the session. An unusually strong list of speakers has been obtained. Among these are Mr. G. P. Hambrecht and Mr. John Callahan, Madison, Wis.; Mr. L. S. Hawkins, United Typothetae of America, Chicago, Ill.; Mr. W. F. Faulkes and Mr. E. E. Gunn, Madison, Wis.

Changes at Carnegie Institute. Faculty changes at the Carnegie Institute of Technology, Pittsburgh, Pa., are comparatively few for the new opening term, according to the president, Mr. Thomas S. Baker. Of particular interest among the appointments are those of Miss Hallie W. Hyde as assistant professor of household economics; Mr. W. Gilchrist as associate professor in the department of painting and illustration; Mr. Russell T. Hyde as associate professor of architecture; Mr. L. D. Lashmit, a former instructor, who returns to the staff in the department of architecture after a year's absence, and of Mr. Samuel W. Washington, who joins the staff of the division of general studies as instructor in industrial economics.

Among the promotions effective for the year 1924-1925 are the following: Mr. B. B. Hastings, from assistant professor to associate professor of structures, of the department of architecture, and Mr. John Blackhall, from instructor to acting head of the forge shop, department of machinery production.

Trade School Planned. A trade school where the various crafts will be taught apprentices has been planned at Louisville, Ky. The new school is to be the gift of a leading citizen, who has expressed a desire to establish the school. Manufacturers and local organizations have expressed their willingness to place equipment and supplies in the building after its erection.

Rehabilitation Work in Richmond. During the last two years the bureau of rehabilitation of Richmond, Va., has investigated 500 cases of handicapped persons of whom more than 100 have been placed in training and about fifty satisfactorily employed. According to the director of the bureau, there are now in training about 75 persons. The average cost for each person trained is about $166, which includes salaries and expenses of employees and overhead charges of the bureau. Artificial limbs were purchased for 75 persons.

Trade School Graduation. More than a hundred students of the Philadelphia Trade School for Girls received their diplomas at the commencement exercises held the latter part of June. Mr. Irvin H. Calhoun, architect for the new trade school, exhibited pictures and described the plans for the new school to be erected during the summer months.

Vocational School Holds Graduation Exercises. The graduation exercises of the New Bedford Vocational School at New Bedford, Mass., were held on June 25th, at the New Bedford High School. Addresses were made by Mayor W. H. B. Remington, Edgar B. Hammond, Wm. R. Mackintosh and Rev. L. C. Harris. Mr. Hammond, who awarded the diplomas, dwelt on the history of the school and its development. The departments of household arts, carpentery, machinery, power, drafting and electricity were represented by the several graduates.

Kansas College Issues Bulletins. The printing department of the Teachers' College at Pittsburg, Kans., has printed and distributed a series of helpful bulletins dealing with the Kansas vocational program. Some of the bulletins contain helpful information and advice for the conduct of night schools. There are also a number dealing with the teaching of vocational subjects by tradesmen and others who have had no teacher-training. Others contain outlines of short-unit courses in different trades. Lesson units for carpenters and brick-layers have also been prepared for early distribution. The bulletins are available for school executives, trade workers, and employers of trade workers.

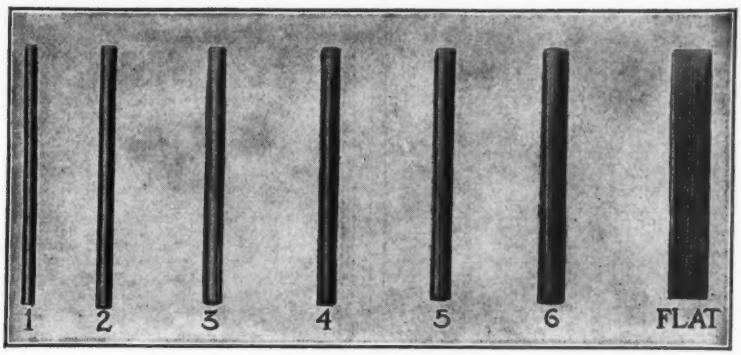
Students Graduate from Prevocational School. One hundred and twenty-eight students were graduated from the Kosciuszko Prevocational School, at Milwaukee, Wis., the latter part of June. Mr. Paul B. Clemens, assistant superintendent of schools, delivered the principal address of the occasion. Features of the program were the presentation of athletic emblems and honorary awards.

Operate on General Shop Plan. The Gridley and Roosevelt Junior High Schools, at Erie, Pa., have been organized on a modified general shop plan. Two shops are provided for at both of these schools. One room is equipped with a complete wood working unit of equip-

(Continued on Page 31a)

BRADLEY'S

— SCHOOL ARTS SUPPLIES —



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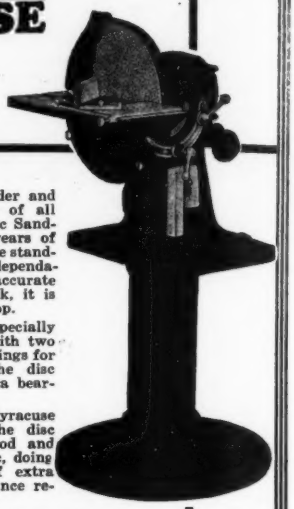

SYRACUSE 15" Disc Sander and Grinder, is the pioneer of all dustless motor-driven Disc Sanders. It has proven by its years of universal service that it is the standard for performance and dependability. Designed for the accurate sanding of a variety of work, it is a necessity in the school shop.

The direct drive motor is specially built and totally enclosed, with two extra large oversize ball-bearings for the purpose of carrying the disc without the necessity of extra bearings.

A special feature of the Syracuse Sander is the design of the disc housing, which forms a hood and guard over the revolving disc, doing away with the necessity of extra guards to conform to insurance requirements.

The Syracuse Sander is thoroughly tested and carefully inspected before shipment, and we are glad to guarantee them for one year against mechanical or electrical defects.

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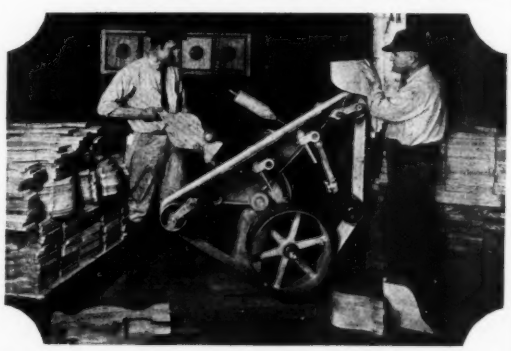
Every School Shop Needs a Belt Sander



This Variety Belt Sander is well suited for the school shop. It can be set up in many different ways to accommodate practically any sanding application on work which can be manipulated freehand against the open sandbelt, rolls, table platen, shaped forms, air-filled sanding spindles or solid drums. The machine is self-contained, requiring no countershaft. It occupies small floor space and consumes little power.

Send for folder showing various set-ups.

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"Everlasting" Chisels

Head, Shank and Blade are forged from one piece of tool steel. Insures great strength and durability. Provides maximum of efficiency, as a blow on the head is transmitted directly to cutting edge.

Leather washer between handle and steel head serves as cushion, thereby relieving handle from shock. Handle of selected hickory, fitting snugly into ferrule.

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THE STANLEY WORKS — THE STANLEY RULE & LEVEL PLANT

(Continued from Page 28a)

ment. The type of work in these shops is enlarged from what was commonly known as manual training to include such repair jobs as are common to the home. The second shop which adjoins the wood working shop has three units, namely, printing, electrical construction and sheet metal work. The printing is limited to that work required by the social activities of the schools, such as tickets, program making, special forms and the printing of the school bulletin. The electrical and sheet-metal construction is of an elementary character. Lesson sheets are prepared to aid the instructors in putting across the jobs.

General Shop Plan. Mr. Paul Cressman, of Cincinnati, in a special report to the board of education declares that the most feasible and economical plan for carrying on the varied work in industrial arts in a junior high school, with an enrollment of from 800 to 1,000 pupils, appears to be the general shop. This offers to the pupil a liberal choice of shop activities and affords to the teacher a fine opportunity for guidance work.

The Gridley and Roosevelt Junior High Schools will be organized on a modified general shop plan. One shop will be equipped with a complete wood working unit. Manual training work will be increased to include repair jobs such as painting, glazing, setting hinges and locks.

The second shop, which adjoins the wood working shop will have three units, namely, printing, electrical construction and sheet metal work. The printing will be that required by the social activities of the school such as tickets, programs, a few forms and the school bulletin. The electrical and sheet metal work will be of an elementary character. It is the belief of Mr. Cressman that in offering a variety of work, it is not necessary to sacrifice neatness, accuracy or good work.

Under the Smith-Hughes law, the shopwork of the vocational courses must be of a productive nature. Where two courses of procedure are open, it appears that better results in socialization will be obtained where the pupil turns out a product for the use of the school district while at the same time receiving instruction in the theory and practice of shopwork. The vocational department, during the past year, constructed 533 separate pieces of school equipment, at a total estimated cost to the schools of $7,554. These pieces of equipment had a total commercial value of $11,867, and were constructed at a cost for materials alone, of $4,313. All of the work, with the possible exception of the products of the pattern shop, were made with a direct saving to the school district. The cost of products excluding that of the pattern shop, was $6,767, the cost for material was $4,267, and the commercial value for the same products, amounted to $11,035.

Ten teachers from the vocational department and many of the trade boys are employed during the summer months in the several schools. At East High School, the print shop was run to capacity this summer, at the Academy Wood Shop, two teachers and twelve boys were employed, at East High School, one teacher and three boys were employed building furniture for the Roosevelt High School and for various other departments of the city schools. The work in industrial and household arts, and in the trades, has been found thoroughly worth while and is slowly but surely meeting some very definite needs in the schools and in the social and industrial life of the community. There is no call for extravagance in any of the work offered but the purpose has been to organize the several courses with an idea of economy as well as of efficiency in carrying out the work of the industrial arts department.

Announce Printing Teacher's Paper. With the first number of "The School-Master-Printer," notice is given of the organization of the Wisconsin Printing Teachers' Association. The organization has been initiated by the vocational printing teachers of the state to bring them into closer cooperation for more effectively carrying on their work. The publication is edited by a staff of three, headed by Mr. C. W. Hague, and is printed and published each month by the Stout Institute Press, at Menomonie, Wis. It contains eight pages devoted to leading articles, items of news, reports of meetings, editorials, and features of interest to the printing teacher. The leading article entitled "A New Organization and a New Periodical" is written by Mr. C. W. Hague, and gives in brief the purpose and objective of the new organization for teachers of printing, and the part which the periodical is to play in making the contact between the members of the association.

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PUBLICATIONS RECEIVED

Industrial Hygiene Bulletin. July, 1924, issue. Published by the New York State Department of Labor, and issued monthly by the Division of Industrial Hygiene. The purpose of the bulletin is to aid in the conservation of the life and efficiency of the industrial workers.

Arithmetic for Workers in a Trade. Short unit course in trade arithmetic. Issued by the Kansas Teachers' College, Pittsburg, Kans. A course intended to aid in the effective organization of trade extension evening classes in related work for the trades. Consists of simple mathematical processes directly applied to work of the trade.

Methods of Teaching Blue Print Reading. A short unit course in methods of teaching machinists to read blue prints. Issued by the Kansas Teachers' College, Pittsburg, The course outlines four methods of giving the instruction, namely: 1. mechanical drawing; 2. machine sketching; 3. recitation or class study; 4. individual instruction. It discusses methods in use, advantages of the method, and order of organization.

Short Unit Courses for Carpenters and Plumbers. Short courses suitable for teaching apprentice and journeymen plumbers, carpenters and mechanics. Issued by the Kansas Teachers' College, Pittsburg, Kans.

The Evolution of a Tin Can. A brief, non-technical article on the manufacture of a typical tin-can container for canned goods. The pamphlet also contains a brief foreword on the manufacture of iron and steel, together with a diagram of manufacture as used for sheet and tin-mill products. The diagram shows the stages of manufacture, the technical names of the equipment used and the products obtained from the raw material in the United States Steel Corporation.

The Print Shop Annual. Work of the class in vocational printing and a few specimens of boys' work as carried on in School No. 24, Jersey City, N. J., for the year ending June, 1924.

The Worker, official paper of the Boys' Vocational School, Newark, N. J. This well-signed issue is devoted to Lincoln, Washington and Wilson.

Making the Most of the Small Shop. Business leaflet No. 5, issued by the Metropolitan Life Insurance Co., New York. The small shop must sustain a reputation for living up to promises of delivery. It must not promise work in a week that facilities cannot turn out in less than three. This pamphlet discusses such items as promptness in filling orders, the working of the machine, a simple production system and the use of graphical records in showing the work ahead of each machine or department. The policyholders' service bureau of this firm maintains a production engineering section which is prepared to aid policyholders in establishing satisfactory production control. It also invites inquiries relative to arrangement, distribution of work, time studies and methods of wage payment.

Vocational Education—The Choice of a Life Work. By C. A. Fulmer. Bulletin No. 8, Nebraska State Board for Vocational Education, Lincoln, Neb. A suggestive statistical study of the vocational inclinations and expectations of 26,000 students in Nebraska high schools.

Manual Training Department, in the high schools of St. Paul, Minn. Geo. M. Brace, director and supervisor. This pamphlet outlines the courses in joinery, wood turning, art woodwork for girls, cabinet making, pattern making, forging, storage batteries, radio, machine shop, art smithing, drafting, machine and architectural drafting, salesmanship, printing.

The General Shopper. One of the useful projects of the Joliet Twp. High School Print Shop is this pamphlet describing the auto-mechanics' course offered in the school.

All-Day Vocational Trade or Industrial Schools and Departments. Administration and Courses of Study. Bulletin No. 7, Trade and Industrial Education Series No. 5, Pennsylvania Department of Instruction, Harrisburg. The all-day trade school has performed, and will continue to perform, a distinct service to the youth of the country in preparing for entrance into skilled industrial occupations. This bulletin has been prepared for the purpose of giving school districts definite information leading to the establishment and operation of effective unit trade courses where needed. The bulletin provides standards for the administration, courses of study, and methods of instruction for all-day vocational trade or industrial schools and departments. Part I discusses unit trade classes and Part II takes up general industrial classes.

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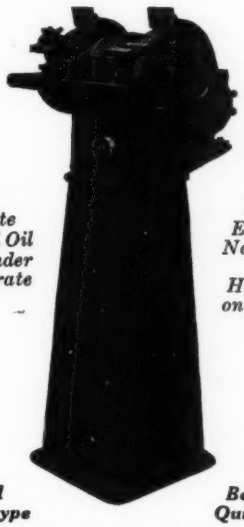

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It Is Efficient Economical Non-Burning Simple Hones Tools on the Wheel

Powerful Pedestal Type

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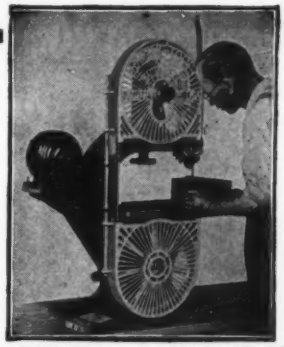

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BUYERS' NEWS

Removal of Offices. The Cleveland Stone Company of Cleveland, Ohio, has announced the removal of its executive offices to the thirteenth floor of the Union Trust Building. The grindstone, artificial abrasive and building-stone departments will be located in the same building.

TRADE PUBLICATIONS

Angle Steel Furniture. The Angle Steel Stool Company of Plainwell, Mich., has recently issued several valuable circulars illustrating and describing in detail, the various special types of stools and chairs which the firm manufactures for use in schools, particularly in school shops and workrooms. The full line includes chairs and stools with metal or wooden seats, and with steel uprights, backs and stretchers.

The Angle Steel Stool Company manufactures probably the largest line of unit-bench legs, particularly suited for the construction of benches used in woodworking and metal-working shops. These legs are manufactured in a wide variety of heights and weights, as well as widths, and meet practically every ordinary school shop need.

The firm makes a splendid series of adjustable leg stools which are particularly adapted to school use and which can be made to fit the needs of short as well as tall pupils.

Issue New Metal Cutting Chart. Under the title of "The Right Saw for the Purpose" the Racine Tool & Machine Company of Racine, Wis., has issued a very practical chart for use as a guide in increasing cutting speeds and reducing cutting costs. In cases where different types and sizes of saws are employed for cutting different kinds of metal, the chart will prove especially valuable in showing speed of machine for size of material, blade equipment, cutting or cooling compound, and machines recommended for use on different types of work.

The experience of the firm in the production of metal-cutting machinery covering a period of fourteen years has been condensed in this chart which has been issued for the convenience of its users. It should prove of great value in the selection of high speed metal-cutting machinery and in effecting the best plan for performing the work.

Furniture for the Drafting Room. The C. F. Pease Company of Chicago, Illinois, has just issued its new Catalog F-24 entitled "Furniture for the Drafting Room." This booklet fully illustrates and describes a complete line of the most approved styles of drawing boards, filing cabinets, drawing tables, draftsman's stools, etc. A copy of this catalog may be obtained on request.

Wallace Portable Machines. The caption of this paragraph is the title of a most interesting circular issued by J. B. Wallace and Company, descriptive of the Wallace Portable Jointer and Planer, Wallace Universal Saw, Wallace Solder Pot, Wallace Lathe, and Wallace Band Saw. The circular will be sent on request to any teacher of wood working.

TRADE PRODUCTS

New Electric Brazer. The Oliver Machinery Company, Grand Rapids, Mich., has just placed on the market a new device for brazing band saws. The device, which is known as the Oliver No. 462 Electric Band Saw Brazer, furnishes a new and better method of brazing band saws. The outfit comprises a transformer, the main coil of which is connected to a power or light circuit, a clamp which serves as a clamp for holding the ends of the saw rigid, a hawkbill or center clamp hand, a switch and cord for lamp socket connection. Heat is available by simply turning a switch, while the consumption of current is comparatively insignificant. It has the advantages of speed, convenience, safety and low cost, is ready for instant use, and is adjustable to various widths and gauges of band saws. The device in operation does not call for a skilled operator. Anyone who can follow directions can make a good braze; the process is fully visible and controlled and the heat is constantly modified by the switch.

Information concerning the device may be had by addressing the firm at Grand Rapids, Mich.

PERSONAL NEWS NOTES

Mr. L. M. Sassman, supervisor of vocational teacher-training at the University of Wisconsin, has recently accepted the position of state director of agricultural work under the state vocational board.

Mr. Leslie A. Rumsey of Rhinelander, Wis., has been appointed director of the Stevens Point Vocational School to succeed G. J. Ehart. Mr. Ehart has resigned to become head of the Janesville School.

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